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Universities Quarterly

APARTHEID AND THE UNIVERSITY

THE UNION of South Africa Government Gazette Extraordinary of 12 April, 1957, contains the texts of two main Bills. The first aims

> To consolidate and amend the laws relating to brothels and unlawful carnal intercourse and other acts in relation thereto.

The second Bill proposes

> To provide for the establishment, maintenance, management and control of university colleges for non-white persons. . . .

Whichever may have been the Parliamentary street-corner on which these two Bills picked each other up, they certainly make an ironically congenial pair. For in the eyes of the Government, brothels and universities would appear to have many problems in common.

Not, it need hardly be said, that the Separate University Education Bill is a joking matter. In its revised form, the Bill relates to the two 'open' universities of Cape Town and Witwatersrand, at which are enrolled some 500 non-white students, or 5 to 6 per cent of their total student body. Apart from observing separation in such matters as residence, games and dances, these two English-speaking universities have hitherto admitted students on the basis of academic qualifications only, and in all academic matters have treated non-white students as far as possible on a footing of equality. There is no need, in *Universities Quarterly,* to discuss the philosophy of *apartheid* which sees itself challenged by this 'open' university policy. But it is instructive to read the Government's Bill and see how true it is that 'if a university is coerced into accepting a practice which is contrary to its ideals, an injury is done to the spirit of academic freedom' (to quote from *The Open Universities in South Africa,* a booklet embodying the views of the Councils of the two 'open' universities).

For without question the Bill proposes to do a major injury to the spirit of academic freedom. Thus it proposes that the Minister (in all likelihood the Minister not of Education but of Native Affairs) shall appoint the Principal and senate of the university colleges (6 and 7), that the Minister shall have the power to appoint, promote, transfer

or discharge the academic staff (20), and that the Minister may also refuse admittance to any would-be student if he thinks fit (11). A member of the staff may be discharged by the Minister (25) if, *inter alia,* he is incompetent, insolvent, shows gross discourtesy, uses intoxicants or stupefying drugs to excess, or if he

(n) publicly comments adversely upon the administration of any department of the Government . . .

or (q) propagates any idea or takes part in or identifies himself with any propaganda or activity or acts in a manner calculated :

(i) to cause or promote antagonism amongst any section of the population of the Union against any other section of the population of the Union; or

(ii) to impede, obstruct or undermine the activities of any Government department.

In case these civil service conceptions of university government are not sufficiently safe and 'closed', it is also proposed towards the end of the Bill (31) that the Minister may make regulations as to

(a) the establishment, maintenance, management and control of university colleges and the disestablishment of such colleges;

(b) the functions, powers, duties and procedures at meetings of a council;

(c) the period of office, the appointment, termination of appointment and resignation of members of councils. . . .

(e) the conditions for admission, and tuition, boarding and other fees;

(f) the faculties and departments and the courses of instruction and training at each university college;

(g) the constitution and functions of boards of faculties;

(h) the admission of students to, the control of students at, and the discharge of students from university colleges;

(j) the appointment, grading, promotion, transfer, discharge, discipline, conduct, powers, duties, hours of attendance, leave and other privileges . . . of persons appointed permanently or temporarily at university colleges.

And finally, in case these regulations prove too lenient, the Minister shall be empowered (31 m) to regulate any other matters 'which he considers it necessary or expedient to prescribe in order that the purposes of this Act may be achieved'.

In short, in order 'that the purposes of this Act may be achieved' the Government proposes to do away with university education for non-whites. For that is what this Bill amounts to. Apart from any-

thing else, the cost of providing equal but separate facilities would be prohibitive. The Holloway Commission of 1953-4 estimated that a new institution for 2,500 students, with all the facilities of the 'open' universities, would cost from £2,500,000 to £3,000,000, or upwards of £1,000 per student. (In Ghana, to take another example, capital expenditure on providing a university college has been about £4,000 per student.) At present the Government provides rather less than £3,000,000 per annum to the universities, so what likelihood is there of it doubling this sum? And then, what calibre of teaching staffs are going to take off their gowns and dress themselves up in the Minister's style of strait-jacket? The staffs of Cape Town and Witwatersrand have bluntly opposed the scheme. And the Vice-Chancellors of the British universities have stated, in their recent letter to the *Manchester Guardian,* that 'the academic aspects of the proposals are open to the gravest objections'. And they went on to insist that what is proposed is

> a scheme of government for them which will prevent the development in these colleges of academic self-government upon which their emergence in due course as full universities depends.

The future of higher education in the Union, for whites and for non-whites, cannot be a happy one. It will be a future of resentment and frustration, of declining standards and prestige. Above all it is bound to be a period of struggle. At their January Conference, the Councils of the 'open' universities realised this and they spoke out accordingly. Today the crisis is upon them, and it is certainly not for people in this country to tell them what course of action they should take. One can only hope that it will be action as effective as their words were eloquent:

> The open universities in this country have not merely the right to resist any unwarranted interference; it is also their plain duty to do so unless they wish to become a party to the betrayal of their own ideals and traditions. These ideals and traditions demand the rejection of any policy involving the exclusion of students on racial grounds. To force a university to abandon its ideals and principles is to affront its dignity and to restrict its legitimate activities, a situation which no self-respecting university can accept with equanimity.

One can understand, as one reads these words, why the Government is anxious to remove non-white students from the liberal contaminations of the 'open' universities.

SUCCESS AND FAILURE AT THE UNIVERSITY

JAMES MOUNTFORD

Vice-Chancellor, University of Liverpool

THE FACT that my pamphlet *How They Fared,* issued by the Liverpool University Press at the end of 1956, was rapidly out of print is a measure of the interest taken in a topic of increasing public concern. Before World War II, such scholarships and other awards as were available from public funds were gained by the very bright boys and girls who, so far as one's recollections go, seem to have been almost uniformly successful. On the other hand, in the days when universities derived less than a third of their income from governmental sources, there was still a place for the 'old lags', especially in certain faculties, who stayed on year after year, contributed abundantly to social or athletic life, occasionally passed an examination, and allegedly became in later life the very backbone of their professions. In between these two extremes there was ample room, too, for the 'good commoner' who was not expected to do brilliant things but who never let the side down badly. The general question of success and failure at the University was rarely, if ever, a matter for discussion even in academic circles: students passed or failed as the case might be; there was satisfaction or headshaking about the fate of individuals; but academic statistics were in their infancy.

Since 1945 there has been a very significant change; and the reason is obvious. For the first year of the 1957-62 quinquennium, universities will be receiving £30,600,000 from the Treasury, a sum which represents about three-quarters of their recurrent expenditure; it is the Treasury, too, which provides most of the money for their buildings; most universities benefit from generous grants made by the Local Authorities in their areas; indirectly much of their fee income is also public money; and many of their students rely on substantial maintenance grants derived from public funds. We must expect, therefore, that Education Committees and Members of Parliament will ask with increasing frequency whether the sums now being spent on university education are justified. There is a legitimate expectation in the mind of the taxpayer and ratepayer who provides so much of the money, that the students who come to us will be fitted directly or indirectly to do a job in a harsh and competitive world which they could otherwise not do so well or not do at all. This does not mean

that we are called upon to abandon the basic concepts of a university and turn ourselves into vocational institutes; but it does mean that we have a kind of responsibility to the community which is more explicit than it ever was before and which we have to take more seriously than we have done in the past. Nowadays the immediate and effective reason for sending the vast majority of our students to us is that they shall obtain a qualification appropriate to their chosen careers; we tacitly accept them on that understanding; and it is a matter of conscience that we should be aware how well we perform that part of our task and consider whether we could do it better.

The purpose of *How They Fared* was to examine the degree of success and failure amongst a particular group of university students. The survey covered students who entered the University of Liverpool in 1947, 1948, and 1949 for a first degree or a first diploma. Less than three years would have given too restricted a field; 1949 was the latest convenient year to take since the final results of students entering subsequently for the long courses of study in subjects like Medicine, were not available; and 1947 was a reasonable starting point since the university had by that time settled down to the post-war increase in the intake of students. The object of the exercise was not to consider results in examinations year by year, but to study what had happened to the student in his course as a whole. That is the only effective criterion. What we really want to know is not the transient academic mishap, but whether a student pursued his studies to their end, obtained the qualification he had hoped for, and kept pace with his fellows or fell behind the normal rate of progress.

The broad picture which emerged was as follows. Out of a total of 2,214 (including 32 undergraduate students from overseas) who entered in those three years, 1,575 (71.1 per cent) made normal progress, that is to say, they obtained the general kind of qualification for which they entered the university, and obtained it within the period which university regulations envisage as regular. Some, of course, obtained a Pass Degree instead of the Honours Degree to which they had originally aspired, and some embarked on their life work with a Conjoint Diploma instead of an M.B.; but all went out into the world at the expected time with a useful training, capable of embarking upon a career, and so having justified such expenditure from public funds as may have been involved. If we add to these 1,575 the 285 whose qualification was delayed only by one year or less, the number of the relatively successful would be 1,860, which,

out of a total of 2,214, gives 84 per cent. Most of these delayed qualifications were in the Schools of Dentistry, Veterinary Science, Architecture, and the Faculty of Medicine (in that order of relative frequency), where the courses are long and beset with examination hurdles, and where the curricula diverge markedly from grammar school preparation. A more precise analysis would deduct from the total entry of 2,214 the 31 who abandoned their courses for non-academic reasons such as illness or transferred to other universities; of the resulting 2,183 the 1,860 would represent 85.2 per cent.

The other side of the picture is given by the 64 students, the completion of whose courses was delayed by two years or more, and the 249 who entirely abandoned their courses not through illness but because of academic incompetence. In relation to the effective entry of 2,183 (not 2,214) these figures represent 2.9 per cent and 11.4 per cent respectively. Apart from overseas students, the highest proportion of abandoned courses were amongst those privately financed (18.2 per cent) and those in receipt of ex-Service grants (16.8 per cent).

These figures, of course, are based on the records of a single university and relate to a survey of three particular years; other universities and other years might show a somewhat different pattern. But so far as I know they are the only figures of the kind yet available; and it is very desirable that further investigations should be made to ascertain whether these figures are typical or not. The measure of outright failure here shown is indeed much less alarming than would appear from some statements which have been made merely on the basis of capriciously selected results of 'first year' examinations; but there still remains the question whether it is really satisfactory that 11.4 per cent should entirely fail to complete their course and another 2.9 per cent should take two years or so longer to qualify than is normal. If a purist urged that the 285 (13.1 per cent of 2,183) who were delayed by a single year or less should also be regarded as having failed to live up to expectations, he would, in my opinion, paint too drab a picture; but even so, the 14.3 per cent who were clearly unsatisfactory students ought to give us pause. At the same time, no one who deals with students expects that all wastage can be eliminated. To repeat what I have said elsewhere: 'It is no part of the function of a university to spoon-feed its students or to act as a forcing house for intellectual weaklings. Admission to a university involves the important assumption that since an undergraduate is a person whose mind and character are already on the

way to maturity, no small part of the value of the education received in the university lies in the fact that the undergraduate implicitly accepts a considerable personal responsibility for the progress he makes. In such a context there will inevitably be some misfits and some failures. The concern of the university, however, and of the public bodies which now so largely provide the tuition fees and maintenance grants for students, is to see that these failures and misfits are not unduly numerous.'

In considering this matter, two points immediately arise: can we say why students fail? and is there anything which we can do to reduce the number of failures? A considerable body of information is available about the causes underlying student failures; it comes from Deans, tutors, Wardens and others who are in close contact with students, and from Faculty and Senate Committees who interview them about their inadequate academic records. External to the university itself, or not immediately within its control, the most frequent factors are: unsuitable working conditions at home; frictions within the family; undue demands on the student for household chores; family and personal financial worries; the strain and waste of time involved in travelling too great a distance daily between the university and home; and the emotional disturbances of adolescence which are no less serious in their effects than they are unpredictable in their incidence. Occasionally a student will attribute his poor progress to the fact that he has been under parental pressure to take a course in which he was really not interested, or that he has lost his enthusiasm, or frankly that he finds the work beyond his capacity. Not infrequently it is misjudged zeal for the activities of student societies which is the trouble; and there is also the lazy fellow who at the university lacks the daily spur which got him over his fences at school. In almost every case, however, it is impossible to isolate one single factor (apart from the relatively few instances of serious ill-health) to which failure can be clearly attributed; generally speaking a variety of causes contribute their quota to the poor result.

The factors just mentioned are all valid and indeed important explanations, as far as they go, of why some students fail; but we must not delude ourselves into thinking that they tell the whole story or that there is nothing for us in the universities to do. In particular, I think there is still much to be done about our choice of students, about our tutoring and teaching, and about our assessment of students' progress at the university.

Ever since the influx of ex-Service students (to whom preferential treatment was given), every university has been inundated with applications from grammar school pupils far in excess of the places which individually they could make available. At first the process was genuinely competitive as between the applicants, since in the universities as a whole there were not enough places to satisfy all reasonably qualified school-leavers. By 1950 conditions were changing: the ex-Service pressure was over, and universities had in various ways increased their accommodation; and though the number of applications to individual universities did not diminish, there were now almost if not quite enough places in total to meet the demand. What now takes place is not the choosing of the top 50 per cent or 60 per cent of school-leavers to the entire exclusion of the rest, but the sorting out as between universities of applicants, almost all of whom could find a place somewhere. For the time being, therefore, there is some risk that, having places available, we may be accepting some applicants who, though qualified on paper, are only of marginal promise; we give them their chance and the community pays if our judgment is at fault. Whether, in the 1960's when the effects of the increase in the birth-rate are felt, we shall revert to the pre-1950 situation will depend on the accommodation we then have and on the increase in the number of University awards from public funds; but in any event we shall continue to have a responsibility to accept only those students whose admission is justified either by their previous achievements or by their promise.

Academic circles must by this time be becoming more than a little tired of discussions about procedures for student selection; but bored though they may be, the problem still remains. G.C.E. results, confidential reports from schools, and interviews, all have their weaknesses. The G.C.E. results are a record of achievement on a carefully defined syllabus; and though the marks or grades awarded in the higher reaches above 60 per cent are thought to be of reasonably good prognostic value, in the middle ranges they are much less useful. It is inevitable, too, that the results should attest not only native ability but the quality of the teaching received at school; but in the long run it is native ability which counts. It is notorious that the reports of heads of schools vary very greatly in value, according to the experience and judgment of the head, the care he takes in writing his report, and (not least) the form of the enquiry made by the university. A good report can be a most useful guide, particu-

larly on just those matters of character and industry which play a large part in a successful University career; but when written under pressure as one of several hundreds that have to be done, a school report may be little more than a formal statement of general suitability. As regards interviews, every head of department thinks he is good at conducting them, and experience doubtless gives most of us some facility in spotting the really good or promising people who may gain Firsts; but that is not the same thing as assessing the more marginal cases who become the source of our failure problems. For the majority of applicants the interview is at present the least reliable of our procedures.

We ought to know much more than we do about the correlations between G.C.E. results and subsequent performance within the university; though some useful work has been done sporadically on this topic, much more is necessary. Ideally, the word of a known and trusted headmaster ought to carry great weight in selecting students and we need to redouble our efforts to make effective and mutually informative contacts with the schools from which our students come; the exchange of formal letters needs to be set against a background of more personal relationships for which an occasional conference is only the beginning. If we are to make the interview a less defective criterion, most of us need to become much more proficient in its techniques, especially in relation to the less obviously gifted students. Above all, we need to consider how the pieces of evidence derived from our various methods are related to each other. Selection can never become a scientific process and some element of subjective judgment is inescapable; but we ought not to deceive ourselves more than is necessary by relying on some undisclosed and fluctuating combination of criteria. It is true that, by and large, we already make a fairly good job of our selection, and the recruitment officers of commercial and industrial firms would probably feel well justified if they made as few glaring mistakes as universities; but our aim must be to do even better than we are doing.

When a student has been accepted, the university tacitly assumes a responsibility for him. The student himself has to provide the industry, grit, and determination; he has to adapt himself to a new way of life, free from daily supervision to which he was accustomed in school; in general, he has to learn to be an adult. He cannot mature if he is wrapped round with cotton-wool; but there is a middle course between a clucking solicitude for one's young brood and sheer

indifference. Many of our students now come from home environments which have no tradition of intellectual endeavour and which afford little opportunity for training in the social graces; they have personal problems arising from their domestic circumstances and they are often worried by nagging financial embarrassments. Even though a good headmaster or VIth form master may have given them good advice about how they should conduct their lives in a university atmosphere, and how they should map out their time, many of them need much more general guidance than used to be the case; and lack of such guidance undoubtedly can and does have an adverse effect on academic work: fumbling in the first two terms, which a word in season might cure, can do irreparable damage. I have often felt that it is a pity that Bruce Truscott's *First Year in a University* is so little known; for arts students at least it is an admirable introduction to university life. If it could be revised so as to give guidance also to science students, it would probably be worth while presenting a copy to every new entrant. Yet no book, however good, can take the place of personal contact with a member of staff who has more than an academic interest in a student. In this matter, of course, the older universities have a great advantage in the formal and informal relationship which exists between the senior and junior members of a college; in the newer universities the halls of residence, if adequately staffed by tutors, take reasonable care of the situation. The real problem lies with students who are in lodgings or live at home; for them we still need to do more than we are doing. Even though it is not always easy for a member of staff to win the full confidence of freshmen, we cannot really be satisfied until we have created an atmosphere in which every student knows and feels that at least one member of the staff takes an active personal interest in his welfare.

General guidance, however, is not the whole of the problem. It is difficult to assess the pedagogic standards prevailing in university class-rooms and laboratories; but enough information filters through even to Vice-Chancellors for them to know that in some instances the students are not being given a fair chance. It used to be the tradition in the Scottish universities, and may still be, that the professor lectured to the Ordinary or First Year; and he took the job seriously and generally was good at it. There may be good reasons why some professors now never see their first year students in class; but it is important that professors should take a live interest in what is going on, even if they do not do the work themselves. Proof of ability to

teach is rarely required when a new member of staff is recruited, and unless his incompetence has become notorious, relative weakness as a teacher is no bar to promotion. Few university teachers have ever had any training in the arts of exposition, and nature does not always supply the deficiency. A curious ethical code prevents heads from listening in to the lectures given by other members of their staff to find out whether they are good teachers or not. We can all agree that it would be impracticable to suggest that no one should be appointed to a university staff unless he had a teacher's certificate; and that vacation courses in pædagogy for university teachers would, for a variety of reasons, be a fiasco. But it is practicable to urge that no head of department should turn a junior lecturer loose on a class without giving him some real guidance about what he has to do and how to do it; and that the young university teacher should be no more immune from friendly visits of inspection to his class than is the young school teacher.

Furthermore, could not the A.U.T. help by compiling a quite simple leaflet of hints covering the needs of all faculties? There is scarcely any topic of teaching technique, however elementary, which would not prove to be the partial salvation of some member or other of university staffs. Above all, heads of departments ought to regard satisfactory teaching ability as an effective and not merely a formal condition for promotion in the case of all staff members whose work goes outside the pure research field.

If I seem to stress this topic, it is not because I think university teaching as a whole is poor; far from it; but because I believe we shall have to take teaching more seriously when the universities expand in the 1960's. This is especially true in the pure and applied sciences. The schools are short of good science teachers, and already there are complaints that in scientific subjects the students who are now coming to the university are much less well prepared than formerly. It will not be a tolerable solution if we penalise these young people by failing them at the end of their first year. Our job in the university is to appreciate the difficulties under which the schools are labouring, and make it our business to supply the remedies. The students who will be coming to us will be the best brains available, and if their factual information or their deeper understanding of their subjects leaves much to be desired, we must step into the breach by organising our teaching on a basis which is pedagogically sound and methodologically economical. We must plan our syllabuses of instruc-

tion, let the students know what is expected of them, and see to it that the lectures they attend are a positive help and not a waste of time and a source of obfuscation. I hear it said that if the teaching in the schools is poor, then university standards must inevitably fall. That is a form of academic defeatism amounting to treason.

My final point indeed concerns standards, and I am aware that some will regard it as indecent to mention the matter at all. But what are university standards? Who defines them? Who defends them? School examinations have often been under fire, and the echoes of Philip Hartog's onslaught still ring in the ears of the approved examining bodies. Do we think that university examinations will for ever be accepted without scrutiny? From experience the university teacher thinks he can recognise a First Class when one comes along: it is evidenced by something called 'alpha' quality. There is a very real safeguard in that Honours examinations at least are assessed independently by internal and external examiners; and so far we can claim to be reasonably above suspicion. But what of the other examinations on which the career of a student may depend? Even though the External is theoretically concerned in them, he often does not have time (especially if he is acting for more than one university) to do more than check levels of pass and fail by looking through a selected handful of scripts. Too often the fate of a first year student will effectively depend upon the competence as an examiner of a junior lecturer, whose expectations may be pitched too high in relation to what can fairly be demanded of the student. The matter is complicated, too, by the fact that syllabuses are often ill-defined or grossly overloaded, and examination papers too capricious. No individual first year student should be failed unless two people, one of them a senior, if not the External, have agreed that he should do so. The supplementary examinations held in September are frequently given as an excuse for a June slaughter: but it is wasteful if it means that students who could be extending their reading in their subjects in preparation for second year work are unnecessarily compelled to fritter away the summer in going over work in which they really ought to have been judged competent. As a general proposition I would suggest that when more than 10 per cent of a class fails, something is seriously wrong with the selection of students, or the teaching they have received, or the examining to which they have been subjected; and that when the failure rate reaches 25 per cent, it is time for what may euphemistically be called a staff reorganisation.

'PARITY IS NOT CONSERVED' A NEW TWIST TO PHYSICS?

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On January 16, 1957, the postman brought me an air letter from the U.S.A. It read: 'Dear Robert, HOT NEWS: Parity is not conserved. Here in Princeton they talk about nothing else; they say it is the most important result since the Michelson experiment. . . .'

It is too early to say whether this is really as great a discovery as the famous experiment by Michelson and Morley which shook the world of science in 1887 and which ultimately, 18 years later, led Einstein to that new way of thinking about space and time which we call the Relativity Theory. Its consequences have hardly been explored; its Einstein has yet to come. Why then has the news caused such excitement? Why has that obscure phrase 'Parity Is Not Conserved' circled the globe like a new gospel?

Let me first translate it into everyday language. It means, roughly: 'Some Laws of Nature Are Not Symmetrical'. You may wonder why this should so surprise us. Nature is full of unsymmetrical things; even the human body, with its semblance of symmetry, has the heart on the left and the liver on the right (with rare exceptions). Even clear, colourless sugar water is unsymmetrical: if you pass polarized light through it it gets twisted to the left, never to the right.

But those are not laws of nature. The chemist can make a substance with all the chemical and physical properties of sugar except that it twists light to the right. The molecules of that substance are related to those of sugar as a left glove is to the right. Indeed, when the chemist tries to synthesize sugar from its chemical elements he gets in the first place a mixture of those 'right-glove' and 'left-glove' molecules; it is a matter of chance whether — as each molecule is formed — the atoms fall into the right-handed or the left-handed pattern. The laws of chemistry are symmetrical and give no preference to one or the other configuration. The sugar cane, on the other hand, makes sugar with the help of enzyme molecules which are of unsymmetrical shape and which enable the plant to produce the same configuration every time and thus to make cane sugar as we know it.

For another example, let us pay a brief visit to Science Fiction.

You have established a radio link and a common language with a craftsman on Mars; then, with enough patience, you might explain to him the construction of a screw and persuade him to make one. You can tell him the material, the length, the diameter, the pitch; but there is no way of describing a right-handed screw so that he doesn't make a left-handed one. The only way to make sure is to show him a pattern, not necessarily a screw, but some unsymmetrical object to which both he and you have access; say a planet spinning on its axis and visible to both of you. You might think you could use the properties of sugar ('make a screw so that it screws in in the opposite sense in which light is twisted when it goes through sugar water); but perhaps the plants on Mars make the other kind of sugar molecules! (You can see why I had to borrow from Science Fiction). The laws of science are neutral; they do not distinguish between right-handed and left-handed objects.

Or so we thought until a few weeks ago. Now let me describe the experiment which has changed all that. It required pretty complex equipment: radioactive materials, Geiger counters, very strong magnets, extreme refrigeration; so complex that only a few laboratories on earth could repeat it. But in principle it was simple enough. It consisted in placing some radioactive cobalt between the poles of a strong magnet, cooling it to a very low temperature and observing the electrons which it sends out. In a specimen of radio-cobalt, such as used here, many thousands of its atomic nuclei break down spontaneously every second, each flinging out an electron at great speed in a random direction. A Geiger counter — capable of registering single electrons as they strike it — will count at the same rate, whether it is placed above or below the cobalt, or sideways; the presence of the magnet does not affect the direction in which the electrons are emitted.

But if the cobalt is cooled to an extremely low temperature — less than one hundredth of a degree from absolute zero — then things change. The cobalt nuclei are little magnets and usually they turn and dance and point in all directions at random, defying our attempts to bring them in line; but at extreme cold they become drowsy and allow themselves to be lined up, with their little south poles all pointing obediently to the north pole of the big magnet.

In that state we no longer expect them to fling out their electrons in random directions. Yet in 1956 practically all physicists were still confident that the electrons would be flung out in a *symmetrical*

manner: as many towards the south pole as to the north pole, though perhaps a different number might go sideways. However, in January, 1957, Dr. Wu, a Chinese-born woman physicist working in Washington, D.C., showed that more electrons are flung out toward the north pole of the big magnet than in the opposite direction.

Do you still want that screw made by our friend on Mars, at whatever cost? Then let us call him again and ask him to build equipment to set up the Wu experiment. We can explain all the details to him, with one exception: he wouldn't know how to tell a magnetic north pole from a south pole. And, of course, it would be useless to tell him that an iron bar wound with a copper coil in the shape of a right-handed screw develops a north pole at the end where the coil is connected to the negative pole of an electrical battery. He could tell the positive pole all right; there are some simple chemical tests for that; but he can't tell a right-handed screw. However, the Wu experiment gives him a way of telling the north pole: it is the one towards which radioactive cobalt, its nuclei frozen into somnolence, flings most of its electrons. And now we can turn the argument round: a right-handed screw is the shape of a copper coil which will produce a north pole at the end connected to the negative pole of the electricity supply. That may seem a very round-about way of describing a right-handed screw; but it is a description which does not depend on a pattern visible to both of us. It relies on the unsymmetric character of a law of nature.

One objection springs to mind: could it not be that cobalt nuclei come in two opposite shapes, like sugar molecules? After all, those nuclei consist each of 27 protons and 33 neutrons which, you might think, would be capable of arranging themselves in different patterns. But that suggestion won't wash; though there is much we have to learn about nuclei, we can be sure that they have no rigidity, that no definite right- or left-handed pattern could persist even for a second. And yet there is something in that suggestion; I shall come back to it before I have done.

Here, then, is a law of nature that is not symmetrical; and admittedly it is the first time that such a law has been found. But why are we so surprised? Why have physicists been so convinced that nature is symmetrical at bottom?

I find it very difficult to give a good reason. The belief in the fundamental symmetry of nature seems to be one of those implicit convictions which are never stated because they seem self-evident.

Perhaps it is because we ourselves are, at least superficially, symmetrical; if we were sea-snails living in screw-shaped shells we might not attach so much importance to symmetry!

Again, scientists tend to get by with the simplest assumptions. If they are philosophically minded — which mostly they are not — they will admit that there is no prior reason why the laws of nature should be simple rather than complex. To assume the simple law is just good scientific strategy, one which in the long run tends to save time even though it often fails in the individual case. Symmetrical laws are attractive because they are simple, but that is no strong reason.

Space itself is symmetrical. That statement would have passed without challenge 200 years ago when Euclid's geometry reigned supreme. But since about 1830 we know that alternative systems of geometry can be formulated, including some which are not symmetrical. Those geometries were toys for the mathematical iconoclast until Einstein, in 1917, gave some reasons to think that the space in which we live is non-Euclidean. True, the deviations from Euclid's geometry were minute even over the vast spaces of the solar system, and utterly negligible within the framework of an atom. A geometry with a twist might have caused some asymmetry in the laws of gravity, but nothing of that kind was observed; the twist, if any, was too weak, and certainly much too weak to have any effect on what happened inside an atom.

But now comes an important point; the emission of electrons from radioactive nuclei is itself a very weak effect; that is, it happens some trillion times slower than one might expect from a simple application of atomic theory. Perhaps that is so because the effect depends for its very existence on some slight twist of space? Perhaps cobalt would not be radioactive if space were not twisted?

Here, my colleagues will note, I am off on the path of private speculation. But some such speculation is strongly suggested by the numbers as we find them in nature. Beta decay (as the flinging out of an electron by a nucleus is called) is some trillion times slower than electric processes in atomic nuclei; the gravitational attraction between two nuclei is some trillion trillion times weaker than the electric force between them. So beta decay seems to stand half way between the strong forces of electricity and the weak forces of gravity. And gravity is undoubtedly tied up with the geometrical properties of space.

It was Einstein who first made space a part of physics, from being just its backcloth. In his General Relativity Theory he gave space a job to do: the job of transmitting, through its varying curvature, the force of gravity which makes apples fall to the ground and planets swing about the sun. In this he succeeded, but at the cost of giving space a degree of reality that makes one uncomfortable. Perhaps space *is* the ultimate reality and matter is merely a disease of space; yet how can we discover the geometrical properties of space without the use of material measuring rods? This, I think, is one of the basic riddles of physics which won't be solved until we succeed in marrying General Relativity with Quantum Theory, reluctant mates if ever there were.

But let me now come back to the discussion of the Wu experiment. I have stated, somewhat categorically, that the cobalt nuclei are in themselves symmetrical; can we then point to something else that is unsymmetrical and tells the electron where to go? We can. There has long been a strong suspicion, recently confirmed, that together with the electron another particle is flung out from the nucleus, a very inconspicuous object with no electric charge and no intrinsic mass which slips away undetected, and is betrayed merely by the fact that the electron does not have as much energy as it should. The existence of this invisible thief was suggested by W. Pauli, around 1930, and the implications of that assumption were worked out by E. Fermi; to him is due the nickname, 'il neutrino', which has become common scientific parlance.

To account for the finer points of radioactivity, Fermi had to treat the neutrino as a kind of electrically neutral brother of the electron; in particular he had to ascribe to it the same spin, i.e. rotation about its axis, as to the electron. Spin itself, I must stress, is not an unsymmetrical property: an electron that is spinning clockwise as seen by you, would spin anti-clockwise if you stood over on the other side. The same was assumed to be true for the neutrino. But there an important point had been overlooked. A neutrino, possessing no intrinsic mass, always moves at the speed of light. Hence you cannot look at it first from behind and then from the front; to do that you would have to move faster than light, and Einstein won't allow you. A neutrino, travelling away from the nucleus that fired it and possessing a clockwise spin — like a rifle bullet fired from a barrel with a right-handed rifling — will look the same to all observers. A dot painted on the side of a rifle bullet describes a screw-shaped path,

and in the same way a neutrino — though you can't paint spots on it — defines either a right-handed or a left-handed screw. A priori it might rotate about an axis across its direction of motion like a rolling wheel; but Einstein cannot prevent us moving from the right of the neutrino to its left, and therefore the clock sense would again be arbitrary, as with electrons.

All this argument is very clumsy and almost impossible to pursue to its conclusion because everyday language is not well fitted to deal with spinning particles that move with the speed of light. The physicist can go through all that and a lot more in a few lines of mathematics; but I want to stress that mathematics is not magic. It is merely another language, in which the ability to deal concisely with matters of interest to the scientist has been purchased at the cost of inability to deal with any other matters. All you can say in formulæ can be said in plain English; but it would take many pages to convey the exact meaning of a formula one line in length.

Let me then skip the rest of the argument and merely report the result: the findings of Dr. Wu can be accounted for by postulating that it is in the nature of the neutrino always to spin clockwise. Now the cobalt nuclei themselves spin, and at extreme cold, in a strong magnetic field, they tend to spin all in the same direction. The nucleus which results from their radioactive decay is one of nickel, which is known to spin less vigorously. The neutrino, with its clockwise compulsion, will tend to go off in such a direction that its own spin helps the nucleus in its transition to a state of less spin, and the direction in which the electron is flung is influenced by that of the neutrino. This is again a long and clumsy argument, but with the aid of mathematics it can be carried through and made quantitative, and the result agrees with the outcome of the Wu experiment.

Does all this mean that the universe has a definite twist? To deal with that question we have to look at quite a different aspect of physics, and take a big leap to the year 1734. A Frenchman, C. F. Dufay, was rubbing various substances, such as glass and resin, and studying the way they attracted light objects and repelled them again after brief contact. He concluded that there was not one kind of electricity but two, which he called vitreous and resinous; bodies carrying the same kind were found to repel each other, while there is an attraction between the two different kinds of electricity.

From that observation stems a controversy which has swung, pendulum-like, through the next two centuries. Dufay suggested that

there were two electric fluids, of equal standing, which were able to neutralize each other; i.e. a body containing equal amounts of the two would show no electrical effects. Benjamin Franklin, on the other hand, pointed out that one could get by with one fluid, of which each body had to contain a definite amount in order to appear non-electric; he spoke of a positive or negative charge depending on whether the body contained too much or too little of this electric fluid.

At the time there was no means of deciding which view was right, and the result was a compromise or, less charitably put, a semantic muddle: Franklin's terms 'positive' and 'negative' were adopted but used in the context of Dufay's two-fluid theory. In other words, one assumed the existence of two kinds of electricity called 'positive electricity' and 'negative electricity', and that terminology is still with us. But the behaviour of electricity as known at the time was completely symmetrical with respect to an interchange of 'positive' and 'negative', and the allocation of those terms to rubbed glass and amber respectively was quite arbitrary.

That symmetry disappeared in the late nineteenth century with the discovery of the electron by J. J. Thomson. The light mobile electrons contained in all matter are always negatively charged, while the positive charge is attached to the heavy part of matter, to the atomic nuclei as we now know. Franklin would have been pleased, for this was a complete victory of his one-fluid theory! he would only have regretted that he had chosen his signs the wrong way round, saddling his fluid — the electrons — with a 'negative' charge.

In 1933 there was the first indication that symmetry was on the way back: positively charged particles, behaving otherwise just like electrons, were discovered in the cosmic radiation. The discovery of those 'positrons' emphasized a point that had been worrying the theoretical physicists all along: the laws of electricity are basically 'charge-symmetrical', they give no reason why particles of some kind should always carry one sort of charge and never the other. Indeed, in 1928, when Dirac succeeded in constructing a theory of electrons that took account of both quantum theory and relativity theory, he found that the existence of electrons of both signs could be deduced from this. He could foresee — and this was indeed found to be so — that an encounter between a positive and a negative electron would lead not merely to neutralization but to annihilation: both particles would disappear in a brief flash of gamma radiation. Each would be the lethal enemy, the 'anti-particle', to the other.

This led quickly to the speculation that not only the electron but each particle had its anti-particle, the two being equally heavy, but opposite in respect of charge, magnetic properties, and so on. From such anti-particles, anti-matter could be formed. Any encounter between matter and anti-matter would lead to wholesale annihilation, producing vast quantities of penetrating rays. This is not happening anywhere near around us, and we can be sure that the galaxy in which we live is all the same kind of matter. But when it comes to other galaxies we cannot be sure.*

You may have noticed the smell of science fiction in the air once again, and indeed I am ready for another flight of fancy. You remember that message we sent to our friend on Mars, asking him to set up the Wu experiment in order to construct a right-handed screw. Let us assume the message was intercepted, on its flight through the depth of space, by an intelligent being who lives on an anti-galaxy. He would have no means of telling that his atomic nuclei carry the opposite charge from ours; he may not even suspect the existence of anti-matter (which is what he would call our matter if he came across a piece of it). He might feel challenged by the message and decide to follow its instructions. Would he succeed in producing a right-handed screw, or would it come out left-handed?

The Wu experiment alone does not tell us the answer, and, of course, we have no anti-cobalt to make sure. But we have nuclei which fling out, not an electron but an anti-electron, i.e. a positron; and with that there must go an anti-neutrino. The Wu experiment has been repeated with nuclei of that type (in Holland) and the result was as might have been expected : the anti-neutrino spins the opposite way from the neutrino. Our anti-craftsman will make a left-handed screw.

Thus our two asymmetries — left-right and positive-negative — are seen to merge into one vaster symmetry. Right- and left-handed screws can be recognised only as long as positive and negative charges can be recognised. So in a sense our craftsman on Mars, even though we didn't show him a pattern, possessed one in every electron, in every nucleus on his planet. Martian plants may produce the wrong kind of sugar; but Martian electrons and nuclei are the same kind as ours. But in the larger context of a universe that contains both matter and anti-matter, symmetry is again restored. A physicist who had stepped,

* See the *New Yorker*, December 15, 1956.

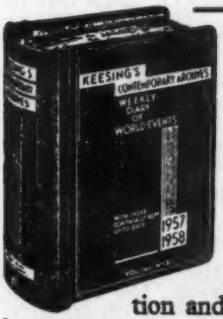
Alice-like, through the looking glass, wouldn't know the difference unless he did the Wu experiment; if the world behind the glass was made of anti-matter he would never know the difference, even with Dr. Anti-Wu to help him.

Has, then, the pendulum come to rest at last? Has symmetry been established for good? I am not so sure. It all depends on whether anti-matter really prevails in large parts of the universe, or whether positrons, anti-protons, etc., are merely sporadic visitors to our world, forced into brief and reluctant existence by the onslaught of a cosmic ray particle or a determined physicist. The light that comes to us from distant galaxies is neutral; it doesn't tell us whether it was sent out from matter or anti-matter. But galaxies sometimes come into collision, and if this happens with two galaxies made of the opposite kind of matter, we might be able to tell, though it happens a thousand million light years away. This is where we look to the radio-astronomers for help. With their giant aerials they can detect radiation from a greater distance than our biggest telescopes. Unfortunately, they cannot show such fine detail, nor do they show the tell-tale spectral lines from which we can learn a lot about the physical state and the temperature of a distant object. So we use them chiefly for scouting: the strong sources of radio waves that they have detected are being taken, one after another, under the scrutiny of the great 200-inch telescope of Mount Palomar. Often the object turns out to be some nearby swirl of hot gas, a small nebula within our own galaxy; but in several cases the big telescope has shown us an oblong blob emitting the characteristic spectral lines of an exceptionally hot gas, all the signs of two galaxies in the slow and inexorable process of mutual penetration, a 'collision' lasting a million years or more. One of those pairs in the constellation of the Swan appears to be even hotter than the others; perhaps here we are watching a galaxy and an anti-galaxy, locked in deadly embrace. But then, perhaps, the extra heat is merely due to an exceptionally vigorous collision; the astronomers are not sure.

So in the end the universe may yet turn out to be asymmetrical, the anti-proton being but a rare visitor, a right-handed screw being recognisable anywhere. This is, of course, tied up with the question of how the universe came into existence; whether it was born in some vast primordial explosion — as Gamov and others would have it — or whether creation is a continuous process, with new matter being born all the time according to the ideas of Bondi, Gold and Hoyle. My own

guess is that the pendulum will yet swing back to asymmetry, and perhaps within the next decade.

After stretching our limbs in intergalactic space, let us come back to Earth. Where is this going to lead? Will it enable us to make better television sets or airplanes? Yes; in a sense. Every advance in our understanding of the physical world will ultimately have some impact on technology; I don't think any discovery in the past has failed eventually to do so. But I don't really care. For me the delight in physics lies in the way it forces our mind again and again to recognize wider and subtler relations; in the sudden illumination when two seemingly unrelated patterns fall into higher harmony. I doubt if I have managed to convey more than a small fraction of it in these few pages. I still haven't explained what parity is, and I couldn't do it without getting much more technical than you could bear. But perhaps I have given some idea of why we think the discovery that parity is not conserved is important. The discovery of fission has opened vast possibilities for power, destructive and constructive; life will never be as it was before. But conceptually it was no great discovery; it could all have been foreseen. Conceptually the new twist that has just been given to the universe is much more important than fission which — to quote my colleague, Dr. D. H. Wilkinson — 'is really of no significance to anybody except people'.



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SCIENCE FOR THE NON-SCIENTIST

F. ARTHUR VICK

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IN THE FEBRUARY 1957 issue of *Universities Quarterly,* Dr. Hanson, Professor Pilley and Mrs. Krook discussed the education of the technologist. Professor Pilley stated that 'our problem is to educate all citizens, and especially those able young people who are going into professional work, to know what they are about', and went on to say that, while recognising 'the importance of developing a scientific habit of mind through education', a technologist would not know fully what he is about without some education in the humanities. Mrs. Krook outlined one way of devising a course in the humanities specially for scientists and technologists.

I would like now to discuss the converse: how can scientists help students of the humanities to know what they are about? It is certain that many of the problems and opportunities of the future will be determined increasingly by developments in science and technology, and that if arts graduates are to continue to play a full part in the affairs of our civilisation their good will must be 'informed by understanding' the methods, scope and limitations of the sciences. But that is not all. Without some initiation into the sciences, an arts graduate is cut from whole regions of creative thought, from some of the most exciting adventures of the mind and from some of the most wonderful, indeed awe-inspiring features of the world in which we live. It is one of the tragedies of modern education that so many arts students who gladly stopped 'doing' general science at age fifteen or sixteen imagine advanced physics to be made up of processes like increasing to 57 the seven methods of measuring the density of a solid which they learned against their will, that biology consists only of classification and that geology is merely the naming of rocks. Some schools that are lucky enough to retain first-class teachers do succeed in implanting in their arts pupils the real spirit of science, but some aspects of science can be tackled only by more mature minds. It is true that it is more difficult for an arts student to gain an understanding of the sciences than for the science specialist to become better educated in the humanities. This is partly because of language difficulties, but more fundamentally because in the sciences there are concepts which, particularly the more abstract ones, are entirely outside the normal

thinking of the arts man though, as we shall see, there are more resemblances between the arts and sciences than are at first apparent. In any case most scientists have spent more time between the ages of eleven and eighteen studying the humanities than they have studying the sciences, and they can read English (even if they cannot write it!), so that it is not very difficult for them to expand their education in the humanities if they are so minded.

In the University College of North Staffordshire, at Keele, some of us have had the stimulating experience and privilege of creating honours courses that are a fusion of thoroughness and breadth. During the first two years of the four-year course, each science student continues his studies of the humanities and social sciences alongside his sciences, and each arts student studies at least one science. These are in addition to the lectures in the Foundation Year course. All such courses are designed to promote independent thought, to remove intellectual blinkers and to discourage the examination of the bigger problems from one aspect only. They are not the pre-digested survey courses about which Dr. Hanson complains in his contribution to the *Universities Quarterly* symposium. (And, incidentally, the broader courses still permit a scientist to spend about as much total time on physics, for example, as a student reading Part I natural sciences and Part II physics at Cambridge.) So the remarks that follow are based mainly on nearly seven years' experience of teaching science to non-scientists at Keele, in addition to some experience in other universities. Though some of the science teaching outlined below can be carried out at school, I am sure some of it is best left to the university.

What are the aims of the courses in science for non-scientists? Perhaps we should place first an understanding of what science is and what it is not. As Professor Dingle has said[1], 'It is one of the paradoxes of modern life that while — on the material and intellectual side, at any rate — it is dominated by science, very few people have any clear idea of what science is. The word conjures up a vague image of machinery and atomic bombs, coupled perhaps with something unintelligible about mathematics and the vast extent of space, but very few can give even an approximately accurate definition of science or know anything at all about the way in which it originated and has come to take the commanding position which it now occupies in our civilisation.' Further, to quote again Sir Cyril Hinshelwood's illuminating remark[2], 'Science is not the dryly syllogistic handling of obvious facts. It is an imaginative adventure of the mind seeking truth in a

world of mystery.' To understand what science is and how a scientist thinks, a student must *do* some science, not just read about it, or study only the history of science. The history is quite fascinating for those who know some science, and in the study of some branches it is the best approach, but in my experience it is not in general the right introduction to science for arts students.

It is best to stimulate a student's interest by plunging straight into a problem or a topic of which he can immediately appreciate the relevance and importance. With keen and intelligent arts students at university level it is fatal to begin by, for example, defining density and then seeing how to measure it. The choice of topic or problem is very wide, and will depend on the interests and enthusiasm of the teacher on the one hand and students on the other. If the topic is well chosen, several things happen: (a) the student discovers he can follow the argument and obtain a result of importance, and so gains confidence; (b) he soon finds that further questions, some of fundamental importance, arise; (c) he begins to appreciate how a problem is tackled scientifically. A few further topics to bring out different points are then discussed, with experiment and demonstration where appropriate, after which the student is ready to tackle a more fundamental and systematic approach. He sees at this stage that such an approach is necessary, though at first he finds it very strenuous, partly because it is so different from courses to which he has been accustomed, and partly because initially he cannot appreciate the structure that is being fabricated from the individual parts.

One or two examples of topics used in the physics courses at Keele might make the arguments given here a little more definite. First, consider chapter II of that delightfully written book *Meet the Atoms* by O. R. Frisch[3]. The chapter begins 'First of all, I want to show you some atoms', which is enough to make any live arts student sit up! The approach is by the examination of luminous watch dials with the aid of a hand lens or a low-power microscope. The room is darkened and a general discussion on how to put one's eye to the eyepiece of a microscope that cannot be seen in the dark follows while students' eyes become accustomed to the dark (a topic is noted in passing for future discussion: what happens during dark adaptation?). Students then observe that some watch dials give a faint continuous glow (this is the kind that gradually gets fainter during the night and does not recover until exposed to daylight once more), while in others the glow is seen under the microscope to be made up of

individual flashes appearing at random all over the field of view. This sparkle continues night after night even if not exposed to daylight. The manufacturers tell us that both kinds of watch dial are painted with a 'phosphor' that glows after exposure to light, but the second kind contains also a very small amount of radio-active salt (all arts students have heard of radio-activity nowadays, though they might have to be told that it has nothing to do with radio). Returning to Frisch after the experiments, we find that a fundamental assumption is now made before proceeding: that each flash is caused by the action of a single atom, and that any one atom can cause only one flash. In making its presence known in this way, the atom changes spontaneously, by radio-active transformation, into another kind of atom and shoots out a particle or radiation that causes the phosphor to flash. For these experiments a radio-active substance is chosen whose product after transformation is not also significantly radio-active.

The next stage in the experiment is to prepare a flashing source containing a known but very small mass of radio-active source, e.g. 10^{-14} gm. of polonium in a thin layer of phosphor on a microscope slide. At this stage, two points are discussed: (a) the meaning of 10^{-14} and the convenience of using powers of ten in calculations, and (b) how to measure out 10^{-14} gm. with an accuracy of, say, one part in a thousand. The latter point brings out the simplicity and ingenuity of some experimental methods. The quantity of polonium chosen is such that the flashes occurring in a minute can fairly easily be counted. At first the rate is about 6,000 per hour. Since each flash represents the transformation of one polonium atom, if the rate were to keep approximately constant, about a million polonium atoms would be 'used up' in a week. But at the end of a week, the sample is still flashing quite happily, so even the very small mass, 10^{-14} gram of polonium, must contain many more than a million atoms. But further experiment shows that the flashing rate has diminished to 5,800 an hour after a week. Hence the rate of flashing has reduced by one-thirtieth (200 out of 6,000). Then the million atoms transformed in the week must represent one-thirtieth of the number of atoms originally present. Therefore 30,000,000 atoms must have been present in the 10^{-14} gram. Hence one gram of polonium contains 3×10^{21} atoms. (In the actual experiment and calculation, more exact figures are used, but even this rough calculation is only 4 per cent in error.) This topic (which is typical of a number of this kind) has

several useful features. It is a revelation to most arts students that they can follow the procedure by which the mass of an atom may be determined. Interest is aroused. The need for revising methods of calculation is appreciated. The reasons for making several assumptions may be discussed, and the scientific procedure of approaching the same result by several independent paths emphasized. This leads to a discussion of other ways of finding the masses of atoms.

The second topic arises directly out of experience, but poses a question which few arts students have ever thought about. When a gas cooker is used at home, the gas tap is turned on, the gas lit, heat produced, and the amount of gas used measured by the meter connected to the gas pipe leading to the cooker. This is straightforward. But if an electric cooker is used, there are two wires, one going in and one coming out. When the cooker is switched on, measurement shows that exactly the same amount of electricity is leaving the cooker as is entering in a given time. What, then, are we paying for? This leads at once to a discussion of the concept of energy. To measure it we need work, force, momentum, mass, and we get back to Newton's Laws of motion. A discussion of these can lead to many things, including the breakaway from medieval thought, and the removal of superstition from science. Another topic obviously arising is 'What is electricity?'

My third topic illustrates different points. It is a group experiment undertaken by the whole class in collaboration in trying to answer a question of which the importance is quite obvious. How much light should we provide in our studies? Too little leads to fatigue and inefficiency. Too much leads to heavy bills for electricity. Without at this stage going into details of the nature of light and of seeing, a few simple definitions relating to illumination are given at this point. Incidentally, the definition of the new international candle can lead to many hours useful discussion. We choose one criterion for the purpose of initial experiments, the smallest detail that can be distinguished under a given illumination. An eye chart is hung on the blackboard, its distance from the eyes of each student roughly measured with a surveyor's tape (a discussion of the accuracy needed in each measurement is timely here) and the sizes of the letters on the chart with a steel rule. A measure of detail seen is then the reciprocal of the angle subtended at the students' eye by the smallest letter seen (the measurement of angle, including the radian, occupies a few minutes here). Then, as the light on the chart is varied and measured

(by a simple illumination meter) at each step, individual students record their own observations. They then take these measurements away, work out their own results, and plot them in any way (or ways) which seem to them to be suitable. Next week, the results are analysed, collected together in various ways and discussed. Any apparent correlations, e.g. between age or myopia and details seen under a given illumination, can be brought out. For the student, this is a true investigation, for he does not know what the answer will be, but he does want to know the answer.

I sometimes make deliberate mistakes in experimental techniques—e.g. putting on the full room lights in the middle of the experiment to draw something on the board, so altering the adaptation of the students' eyes, leading to peculiarities in the results and further useful discussion. If desired, this experiment can lead to the investigation of the factors in correct lighting, such as glare. I feel that group experiments of this kind are not sufficiently used in teaching. They do not need much apparatus or take up much time, but illustrate in a most valuable way some of the methods of science.

One of the main difficulties encountered is the use of technical terms. There is no excuse for using jargon where plain English would serve, but technical terms are quite essential. Consider a cookery recipe, a knitting pattern or the description of a cricket match. What would the non-musician make of 'the last movement, marked allegro vivace, is in rondo form and the main theme is announced by the wood wind'? Precision of thought implies precision of language. In the physical sciences terms like force, power and charge not only have much more limited and definite meanings than in everyday speech, but they are defined in such a way that the relationships between them can be made quantitative. The botanical name of a plant can be very informative to the initiated. Most students learn to appreciate the logic and coherence of scientific definitions. They next have to lose their fear of mathematical language and processes, and to learn that the choice of the right symbols makes scientific thought much easier and not more difficult (how would you multiply XXIV by XIX?). This does not imply that a course in the physical sciences need involve advanced mathematics: it is surprising how much can be done with very simple algebraic manipulation, the ability to handle indices and to interpret simple graphs. A significant proportion of intelligent arts students cannot do any of these things with confidence, and they have

to be taught. The ability to think quantitatively where appropriate is not the least valuable outcome of the course.

Nowadays there is a tendency in some quarters to imagine that scientists can solve most problems. So it is necessary to stress that scientists deliberately limit their fields of enquiry to those that can be cultivated by their own tools and methods. This leads naturally to the differences between mathematics and the experimental sciences. 'The mathematician may say anything he pleases, but the physicist must be at least partially sane.' A scientist must observe and experiment. 'It were disgraceful, therefore, did we take the reports of others upon trust, and go on coining crude problems out of these, and on them hanging knotty and captious and petty disputations. Nature herself is to be addressed; the paths she shows us are to be boldly trodden; for thus, and whilst we consult our proper senses . . . shall we penetrate at length into the heart of her mystery.' (William Harvey, 1628.) So the design and interpretation of experiments form an important part of the course. In biology and geology this involves field work, and in all the experimental sciences it is made clear that the eye, hand (and nose!), even when aided by instruments such as the telescope and microscope, are not enough: they must serve a well-prepared and educated mind. Observation is more than seeing. Such training (in some ways akin to the training of an artist) leads to a greater awareness of our surroundings and may stimulate the acquisition of lasting hobbies.

At this stage, the intelligent arts student perceives an apparent inconsistency. You remarked earlier, he will say, that science is an imaginative adventure of the mind. How can this be reconciled with just asking questions of nature and recording the answers? This leads to the discussion of such questions as 'What is meant by the statement that J. J. Thomson discovered the electron in 1897?' 'How did Rutherford infer from the behaviour of alpha particles scattered by a metal foil that an atom contains a very small, massive, positively-charged nucleus surrounded by a relatively large volume sparsely inhabited by planetary electrons?' 'What is electricity?' 'What is the evidence for the view that the universe is expanding?' 'How do we estimate the age of the earth?' 'How do chemists know the arrangements of atoms inside a complex molecule?' To none of these questions does nature give a directly observable answer. From such discussions students gain a better understanding of scientific method. They learn the status and uses of hypothesis, theory and law. They

appreciate the value of statistics, particularly in biology, where the material and environment are so variable. They examine the 'scientific method' as set out in some books (hypothesis, design of experiment, experiment, clear results, prediction, verification, etc.), and find that in the vast majority of cases nothing could be further from the truth. Though scientific investigation does contain these elements and does involve a great deal of sheer grind, it is by no means a mechanical process. Inspiration and imagination are just as important in science as in any other creative activity of the human mind. Scientific investigation is an art, to use what is virtually the title of the book by W. I. B. Beveridge. Science did not develop in that nice logical order set out in the textbooks.

Though theories and concepts in science may be imaginative, they must be consistent with experiment and observation. Science is now so vast and moving so rapidly that no one scientist can possibly repeat all the relevant experiments in his chosen field. He has to take many on trust, and rely on the integrity of his fellows. A student must learn to appreciate how a concensus of opinion forms in science, the importance of publication and of discussion at meetings of learned societies. Science is truly progressive in a way that few, if any, other subjects are.

The student is now ready to discuss some of the interactions of science with other subjects such as philosophy, religion and economics. He can be shown how far the methods of science can be used outside the traditional sciences, for example applications of operational research in war and peace. He can now look back at certain aspects of history in a new light, e.g. the rise of science in the seventeenth century,[4] and the industrial revolution. He can trace the changes in thought, such as the overthrow of the mechanistic approach in physics at the end of the nineteenth century. He can discuss contemporary problems such as the genetic effects of hydrogen bomb explosions, the problems of world food supply, the importance of the nuclear power programme and the problems of water supply. He can also learn something about the organisation of science in this country, the function of government establishments, research associations, industrial laboratories, etc., and the differences between research, development and design. He will appreciate the changes in structure of industry brought about by advances in science and technology.

What difference do these courses really make to the arts student? They certainly give him some appreciation of science and scientists

and remove any snobbish tendency to look down from a pedestal on science. They help to recapture that curiosity about the world in which we live, which sometimes seems to be lost after childhood. They enable the student to see that truth has many aspects, and to assess the relative magnitudes of the various factors that should be taken into account before making a decision. They toughen the mind, stimulate the imagination and broaden the outlook. They give practice and confidence in quantitative and logical thinking. They enable him to understand much better a whole range of contemporary problems. They open more doors, not only to intellectual adventure but to successful careers. Many employers have said how much more immediately valuable our arts graduates from Keele are because of their science courses. They give the student humility in the face of the wonders and mysteries of nature, for greater familiarity with the details of the structure and behaviour of living and non-living things does not bring contempt, but wonder and awe. 'The heavens declare the glory of God and the firmament showeth his handywork.'

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ROCKEFELLER MONEY AND BRITISH UNIVERSITIES

W. H. G. ARMYTAGE

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EVER SINCE George Peabody gave half a million pounds to improve the living conditions of London workers, wealthy Americans have assumed an increasingly avuncular role in English social life. Carnegie's millions renovated and reanimated the Scottish universities and created amongst other things 163 public libraries in Great Britain. The Brooks-Bryce, Walter Hines Page and Harkness awards have enabled twentieth century British scholars to wander, almost at will, in a country where universities are more important and more numerous than cathedrals. Yet of all the transatlantic patrons none have such a call on the prayers (if any are said today) of certain British universities as John D. Rockefeller, whose money enabled British universities to grow when axe and the depression were taking toll of other public services. If the British groves of academe ever obtained enough surplus wealth to indulge in statuary, the Rockefeller foundation might claim an avenue for themselves.

Rockefeller's giving was originally modelled on Carnegie's. 'Be assured,' wrote the former to the latter in 1889, 'your example will bear fruit.' And what fruit it was! By 1900 Rockefeller had given over ten million dollars to the University of Chicago alone. After 1914 over twice that amount was given by his Foundation to British universities. It is the Rockefeller Foundation since he provided the money, but its real genius was F. T. Gates, founder and leader of the Baptist Education Society. Gates so won Rockefeller's confidence that as financial advisor, analyst and scrutineer of all appeals to Rockefeller's speculative sense or generous impulses, he became the President of the first two Rockefeller charitable Trusts. These were the Institute for Medical Research (founded in 1901) and the General Education Board (founded in 1903). These two developed the policy which led to the incorporation (in 1913) of the third and most important, the Rockefeller Foundation.

Working through the International Health Commission and the Division of Medical Education (created in 1919 and later renamed the Division of Medical Sciences), George E. Vincent, its president and a former president of the University of Minnesota, announced

its aim as 'not to assume governmental or social function, but to show that certain things can be done successfully, and that as soon as may be to turn these over to the community.'

In Britain these 'certain things' at first centred round the reorganisation of medical teaching on the Clinical Unit System. This owed much to Abraham Flexner's *Report on Medical Education* published under the auspices of the Carnegie Foundation in 1910. Flexner won adherents in England, notably Sir George Newman, who believed that university medical departments within hospitals would provide better opportunities for clinical practice, teaching and research than the existing system of part-time professors. Newman's Report was published in 1918, and in the following year the Rockefeller Foundation sent the incisive and aseptic Dr. Richard M. Pearce to investigate British Medical Schools.

Pearce had worked under Simon Flexner at the University of Pennsylvania in the early part of the century, and subsequently occupied the first chair of research medicine to be established in the United States. Vision and imagination made him an admirable director of the programme of medical education inaugurated by the Foundation. On his recommendation the Foundation gave £835,000 to University College Hospital Medical School to establish itself on clinical unit lines. This enormous grant, £400,000 of which was for buildings and equipment alone, was described by the U.G.C. as 'magnificent'. The U.G.C. subsequently supplemented Rockefeller grants for similar units at St. Bartholomew's, St. Thomas's, London, Middlesex and the University College Hospitals. Pearce was well justified in saying that the Foundation had produced by its first major grant 'the most compact and complete medical school in Great Britain'. Observers saw in it the leading medical school of Western Europe.

Even in the Carnegie country of Scotland the Foundation was active. A further half million dollars was given to the University of Edinburgh to improve teaching and research facilities in medicine. As an overall stimulus, a system of fellowships was instituted to bring the leaders of medical education to the United States or Germany, indeed to anywhere where new ideas were germinating.

When the Geddes axe was being wielded and the annual non-recurrent grants paid by the U.G.C. to all British universities and colleges were dropping from £393,000 (for 1919-20) to £272,750 (for 1921-2), then to £48,285 (for 1922-3) and finally £19,000 (1923-4), the value of the Rockefeller grants becomes apparent.

Nor was this money confined to improving medical education.

Lord Beveridge, recalling in his autobiography *Power and Influence* (1953) his years as Director of the London School of Economics, tells how he was persuaded by Graham Wallis to meet Beardsley Ruml, then Director of the Laura Spelman Rockefeller Memorial (established in 1918 and at that time independent of the main Foundation). Their talks in 1923 at Liverpool 'opened', in Beveridge's words, 'a new chapter in the History of the School'. A grant for building, 20,000 dollars a year for four and a half years to provide research assistance to the teaching staff, was followed by a further grant of 155,000 dollars for basic needs, including a full-time chair of Political Economy. These were followed by an even greater grant of 875,000 dollars (£180,000) for teaching and research in the social sciences and international affairs, and developing the library. This last grant, according to Beveridge, 'transformed the financial position and the possibilities' of the School, and made possible the appointment of Bronislaw Malinowski, Arnold McNair and Lancelot Hogben to chairs.

The transformation which Laura Spelman Rockefeller Foundation money effected in the London School of Economics was a prelude to an even greater transformation effected in the University itself. As the metropolitan university, London had long lacked a real administrative headquarters for its vast congeries of colleges and research institutions. The British Government realised this, and in 1920 offered the university 11½ acres of land in Bloomsbury on condition that King's College moved thither and sold their Strand site to the Government. King's College refused to move, so the Government then sold the land back to the vendor. The project might have collapsed but for the fact that in 1927 Lord Beveridge was able to obtain a grant of £400,000 from the Rockefeller Foundation with which to buy back the Bloomsbury site. To obtain the remainder (some £212,500) a supplementary estimate had to be presented to Parliament by the Government. So the functional crag that now towers over Bloomsbury, serving not only as administrative headquarters for the University of London, but as a central meeting place for a large number of bodies concerned with the University policy in Great Britain, owes much to Rockefeller money. Well might the U.G.C., in their post-quinquennial report of 1928-9, acknowledge that of the total private benefactions for endowments, sites and buildings of £5,500,000, no less than £1,700,000 had been given 'by generous corporations and individuals

in America'. This was far more than the U.G.C. itself had been able to give during that decade, and far more indeed than it had ever given in non-recurrent grants.

The Rockefeller Foundation's grants, previously channelled to medicine and public health, now spread over a number of other fields. Projects like the Shakespeare Memorial Theatre at Stratford-on-Avon had been helped from the Laura Spelman Rockefeller Memorial. After 1928 the Memorial was merged with the Foundation and the International Education Board was wound up. The Foundation redeployed its resources to cultivate three fields other than Health and Medicine, namely, Natural Science, Social Science and the Humanities. In other words, the dissemination and application as well as the advancement of knowledge was now to be helped, and at the very time when the depression was about to set in. It was extremely fortunate that at this time both Oxford and Cambridge were enabled to reorganise their long-obsolete library systems. Nearly forty years before this Mr. Gladstone had appealed to Carnegie in a letter written with his own trembling nonagenarian hand for money with which to save the Bodleian. Now more practical and, as it transpired, more successful methods of reorganising these libraries were undertaken.

Cambridge had been discussing a new library since the seventeenth century. They appropriated the old Senate House in the eighteenth and a series of extensions were built in the nineteenth century, till by 1905 the final room on the site was appropriated for the library. Ultimately 7½ acres of land were obtained from King's and Clare, and Giles Gilbert Scott submitted plans for a new library costing half a million pounds. One legacy of £65,000 from the Rev. J. H. Ellis enabled the senate to provide half that sum, the other half came from the Rockefeller Education Board. The Board did more! They invited a commission to visit some of the chief American libraries, a visit which was undertaken in the autumn of 1930. The builders of the library named the main reading room in the South Pavilion the Anderson Room, in honour of Sir Hugh Kerr Anderson, the Master of Caius, to whom 'more than any other man' was due the securing of the Rockefeller grant.

Oxford was, if anything, in a worse plight. One scheme to build a new university library, with rooms for advanced study and research, was defeated by a large majority before Congregation. Another scheme, for a bookstore on the Broad Street site was also defeated on the same day. Here the Rockefeller Foundation slipped in and

suggested that they should make official enquiries at other newly-constructed libraries in Europe and America. This the University accepted on 4 March 1930, appointing Sir Henry Miers as chairman of a commission, which issued a long report, *Library Provision in Oxford* (1931), and provided a modified version of the second Scheme, estimated to cost £944,300. The Rockefeller Trustees agreed to contribute three-fifths of this on condition that the University found the remaining two-fifths within a given period of four and a half years. That condition was satisfied in one.

To those who worked under Rockefeller auspices, like Abraham Flexner (secretary of the General Education Board and the driving force behind the programme of cultivating the Humanities in the universities), the sums then available for the support and development of the English universities in the inter-war years seemed 'pitifully small'. Abraham Flexner amplified this. In his *Universities American, English, German* (1930) he wrote:

> The total sums at the disposal of the University for advanced work are far from adequate. For graduate work the provincial universities provide only incidentally. Even with the aid of the University Grants Committee great projects . . . and support of even small university clinics cannot be undertaken. Funds are lacking!

He concluded with some wise and prescient advice:

> From the standpoint of ability to finance universities and research, it is, however, well to remember that as a matter of fact the British debt at the close of the Napoleonic Wars bore the same relation to the national wealth as is now borne by the present debt. The previous debt was not extinguished, but it was virtually reduced to insignificance by the expansion of English industry, by steam, coal, iron. Is it not conceivable that, if England similarly developed physics and chemistry, a comparable phenomenon would occur?

That development, during the thirties, was itself a Rockefeller concern. One example, the sphere of textile physics, shows how prescient Flexner's remarks were. From 1933 onwards, X-ray studies of the biomolecular structure of wool, keratin and other proteins by W. T. Astbury at Leeds University was supported by the Rockefeller Foundation. Astbury's X-ray work, which had already established the skeleton structure of the wool molecule, was the foundation of all later knowledge of wool textile processes, of all present-day methods of cold permanent waving in the hairdressing industry, and of the work on the production of Ardil from the protein of ground-nuts by Imperial Chemical Industries. The £45,000 which the Rockefeller

Foundation gave to these researches was well spent. A similar story could be told at Sheffield of their help to Professor H. A. Krebs, the Nobel Prize biochemist.

Nor were the Rockefeller Foundation's activities limited to grants in aid. Different divisions of the Foundation awarded regular training fellowships. For thirty years it enabled the British Medical Research Council (established in 1919) to dispatch a picked nucleus of research workers to study overseas. Half a million dollars has been expended in this way, and the names of the fellows include Sir Howard Florey, Sir John Conybeare, Professor A. A. Moncrieff and Professor C. H. Waddington. Then again, during the second world war, when British facilities for medical training were stretched to breaking point, the Foundation, working through the Committee of Vice-Chancellors and Principals, enabled many promising young medical trainees to spend two-year periods at twenty-three medical schools in the United States and Canada. Promising individuals have also been helped in their own institutions to obtain vital apparatus at a time when the calls on university finances have been unusually heavy. The projects so assisted include the scientific research units as well as the re-stocking of the National Central Library at London (itself owing much to Carnegie generosity).

'Money is a feeble offering without the study behind it to make its expenditure effective.' So John D. Rockefeller wrote in his *Random Reminiscences of Men and Events* (1937). This is the greatest lesson his foundation offers to Britain today. The trustees to whom he delegated power put great effort into their giving, and were able (within human limits) to discriminate between the promising and the pedestrian, between ability and make-believe. The U.C.G., as the contemporary counterpart of these trustees, work (through their specialist committees) in much the same way, reinforcing their study by travel and interview.

Up till the end of 1956 no less than 28,761,453.87 dollars was spent in Great Britain by the Rockefeller Trustees. And Britain was but one of ninety-two other countries and political divisions of the world helped by them. The bulk of this money came to help British universities during the inter-war years when losses on their own investment income, due to a reduction in interest rates, were but a part of the stringencies that so hampered their normal growth. Twenty years ago the University Grants Committee reported on the third inter-war quinquennium, and members confessed themselves 'forcibly and pain-

fully impressed by the high proportion of university accommodation which is not merely undignified, but frankly sordid, besides being congested and inadequate'. They added: 'There is perhaps a risk that those who from the noblest motives consent to dwell in "slums" may in time become so acclimatised by their surroundings that they cease to be shocked by them.' The U.G.C. was itself helpless in this matter, for during that quinquennium (in 1931 to be exact) they had to surrender to the Treasury their accumulated reserve of £150,000 which would normally have been expended in non-recurrent grants to universities.

Today the whole pattern has changed. The U.G.C., representing indirectly the British taxpayer, is a real legatee of Carnegie and Rockefeller. Flexner and Ruml have their counterparts in Moberly and Murray. The important difference is that whereas the former could make their decisions almost as absolute value judgments, the latter have had their terms of reference defined as 'the preparation and execution of such plans for the development of the universities as may from time to time be required in order to ensure that they are fully adequate to national needs'. The latter have also a second limiting circumstance to cope with: the annual off-stage criticism of the committee of Public Accounts. This criticism, which is directed to securing stricter parliamentary control over university finance, has a most abrasive effect. Indeed, *The Times* referred to it on 14th February this year as a 'long war of attrition'. In making good the neglect of the inter-war years and planning for the future, the U.G.C. needs both freedom of movement and secure resources from which to operate. Only in this way can it discharge its terms of reference. The Rockefeller Foundation was a public trust with an elastic charter giving the trustees full responsibility for the organisation and use of grants which were never tied to rigid and unchangeable purposes, and our contemporary U.G.C., whose span and range of activities is far larger, will in future have to give the kind of help which was previously given by the Rockefeller (and Carnegie) Trusts. Perhaps it is not unfitting to close by indicating a very visible connection between these twentieth century patrons.

The first Chairman of both the University Grants Committee and of the Advisory Council on Scientific and Industrial Research, Sir William McCormick, was also the first secretary of the Carnegie Trust for the Universities of Scotland. Some future historian will, no doubt, explore the way in which experience in one office helped him in

another. And he (or she) will reflect on the remarks which closed the last report of the U.G.C. Sir William McCormick* was spared to approve, before his death in 1930, remarks elicited by the perennial (or should one say quinquennial!) question of money:

> A University which allowed itself to become the 'tied house' of any special interest or calling, would lose the world as well as its own soul, for it would soon be found that every limitation of its academic freedom was accompanied by a weakening of the very qualities which originally made its services seem so desirable to secure. The Universities cannot indeed isolate themselves from the practical affairs of life, in which it is one of their duties to fit their students to take a useful and enlightened part, but the principle for which they primarily stand is the disinterested pursuit of knowledge in all its branches, with freedom for the spirit of enquiry to follow whatever path its work may disclose. If, as we are often tempted to believe, 'the faintest of all human passions is the love of truth', the welfare of those great institutions which exist to keep that passion alive, is second to none among the nation's needs.

Well might his colleagues therefore say of him that 'if a sincere and even jealous regard for the autonomy of the Universities is now an accepted principle of Government policy, this is due to our late Chairman more than to any other man'. That such an attitude could be adopted with such confidence in the lean first decade of the U.G.C.'s existence was in no small measure due to the generous and imaginative help afforded by the Rockefeller Trustees which has been outlined in this article.

* It is sad to see his work apparently neglected. Thus H. W. Dodds, L. M. Hacker and L. Rogers in *Government Assistance to Universities in Great Britain* (New York, 1952) wrote (p. 82): 'Since 1919 the U.G.C. has had only two Chairmen: Sir Walter Moberly . . . and Dr. A. E. Trueman'. As a matter of record there were four. Sir William McCormick (1919-30), Sir Walter Buchanan Riddell (1930-4), Sir Walter Moberly (1935-49) and Sir A. E. Trueman (1949-53). When the jubilee history of the U.G.C. is written other connections will no doubt be revealed.

UNIVERSITY COMMENTARY

CHARLES MORRIS

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IT NOW SEEMS fairly clear that we are all to aim at making the universities ready for a student body of about 120,000 in 1966 as compared with about 88,000 in the present session. Without doubt it will be difficult to achieve so much, but it is now widely agreed that it would be a serious mistake for the nation if a smaller programme were accepted. Even so the numbers of scientists and technologists of professional grade will be quite insufficient to meet the needs of the country's situation unless the Minister of Education can make an outstanding success of his White Paper policy for the colleges of technology. If, as is still perhaps not certain, the progress of these colleges is not held back by niggardly finance, the main problem in this field will be to find the students. It is not so much that they are simply not there as that they may not come forward. In the New World, and in the 'new' countries generally, young men and young women will find their own way into the universities even if they have to earn their own living at the same time as they pursue their full-time student courses. But in this country this has not been so. The grammar schools have found it very difficult to keep boys and girls of sixteen at school when their contemporaries, living beside them in the same streets, can go immediately into industry and commerce and live more 'adult' lives which demand less discipline and effort and seem to them to give more pleasure. Even the middle classes are coming to tot up the account with much care and calculate exactly whether or not it will pay to send the boy to college. If not only the universities but the colleges of technology as well are to be able to fill themselves with well-prepared full-time students, opinion in the families and schools of the nation will have greatly to change.

Will there be a shortage of students?

It may be that the universities themselves, if sufficient student grants are available, may find the necessary numbers without too great difficulty. But it would certainly not have been reasonable to predict so much two years ago. In the session of 1953-4 numbers had fallen, and though they improved in 1954-5 the increase was slow. But for the last two sessions the pressure on the available places has

been steadily mounting, and the signs are that it will continue to do so, perhaps until the 'bulge' in the birth-rate begins to affect the universities in 1964 or thereabouts. What is more, the pressure is being felt especially in engineering and the technologies. It cannot yet be known whether a similar access of new full-time students will come to the colleges of technology; perhaps, indeed, it is still not certain that the flood will be strong enough to provide the full complement of 120,000 students for the universities. It may therefore be well to try and find out why student life is acceptable to greater numbers of the young than it was three or four years ago. For if something needs to be done to bring in the students — if the provision of buildings and qualified academic staff is not of itself going to be enough — it needs to be done quickly.

A change in public opinion

There can be no doubt that the grammar schools have been putting up a magnificent fight now for many years, first to keep boys and girls at school after the age of sixteen, and then again to send those who are qualified at eighteen on to college or university. The second fight is now perhaps largely won; perhaps from most schools some four-fifths of those who are well qualified actually try to go on to the universities. But everyone who is called upon to go to speech days and prize-givings will know well that in many parts of the country the first battle is still far from won — or at least it was far from won up to three or four years ago. We may take it for granted, I think, that the schools were making every possible effort all along. More recently they have, in addition, been giving careful and well-directed advice to boys and girls about where they should go and what they should study for their university careers. Engineering and the applied sciences and technologies at the universities have benefited greatly from this campaign of good advice.

But it is almost certain that action by the schools has not in itself been sufficient to bring about the present more favourable situation. A general swing in public opinion has undoubtedly been the main cause. For a long time now the glamour which the scientist and the engineer have been acquiring since the discovery of the atom bomb has been spreading in ever-widening circles, and at long last it has begun to affect the aspirations and ambitions of the great mass of the people. No doubt it has set alight the stars in the eyes of a sufficient number of the little boys themselves for a long time now; but at last

it has affected the parents, and in matters of this kind it is undoubtedly the parents who count. There are still very large numbers of English fathers and mothers who feel it will be safer and pleasanter for their children to be content with the kind of lives that they themselves have led. But they seem now to be changing their minds, and in significant numbers. It is probable that neither the universities themselves nor the schools have played a primary part in bringing about this comparatively sudden change. It is a swing in general public opinion due to wider causes. But presumably it can be promoted and fortified.

What of the Arts?

It is to be expected that the drawing power of science and the technologies will affect recruitment to the other faculties. Until recently there was a great shortage of dental students, though here again there has been a change of public opinion in the last few months and the dental schools are said to be full in the present session. Medical schools have, it is true, had long lists of applicants, but there has been a good deal of murmuring about quality; it seems to be widely felt that medicine is not attracting its share of the really able young men and women, presumably because they have been going to science and engineering. But in general it may be assumed that though it will have its small ups and downs — and no doubt it is down at the moment — the greater medical profession will be able to look after its problems of recruitment pretty well. But what about the Arts? In some quarters outside the universities an opinion seems to be building up that, at about 35 per cent to 40 per cent of the total student body, the arts faculties are too large for the national interest. Indeed there will almost certainly be considerable pressure upon the universities from the Government and the public to try and see to it that a very high proportion indeed of the increased numbers of students shall go to the sciences and technologies. But whatever might be thought of the wisdom of this, such pressure is likely to have only a beneficent effect so far as planning is concerned. It will do something to ensure that in the departments of science and technology, where planning ahead is essential, enough places are provided. The arts departments are much more flexible, and their destinies are far less at the mercy of the planners.

Actually it is not easy to predict what will happen in the Arts. Presumably no government in this country will attempt to direct students into science or technology, nor even deliberately to determine

the choice of would-be students by a repressive or dictatorial differential grants policy. In fact, and in accordance with our tradition, student choices will no doubt continue to be free. They will therefore be determined partly by natural aptitude and interest, partly by the climate of general opinion, and partly by the situation in the schools. As regards the last of these, if very few scientists of personality find their way into the schools because as at present the attractions to them to go elsewhere are overwhelming, the teachers in the arts subjects will largely control the schools; and though they will try to give the best advice they can to each boy and girl, the attractions of the scientific subjects will undoubtedly suffer. But it is to be presumed that the shortage of scientific teachers will by one means or another be stopped; and the pulling power of the different subjects in the schools — or at any rate in the boys' schools — will remain very near to what it has been of recent years.

A general education?

But in any case, the overwhelming influence will be that of general public opinion; and this will itself be the effect of a great variety of causes. It is to be feared that the issue may be unavoidably determined by comparatively pedestrian reasons. Does the study of history or philosophy or literature provide a good training for a sufficient number of professions? In the Oxford and Cambridge of half a century ago the great majority of undergraduates who did not expect to use directly for their subsequent careers the learning they acquired at the university, devoted themselves to the study of classics or history if they were men, of history or English or French if they were women; and the prestige of these studies as providing an education for the professions and for the public service still in considerable measure persists. But will it continue to do so? Or will the pattern of the future be different? Will the 'specialist' study of history or philosophy disappear at the universities except for the future scholar or teacher, and will the alternative to a scientific become a 'general' education? It is perhaps not possible at present to read the signs; partly for this reason it is not easy to predict the numbers of students. The universities have changed very rapidly in the last ten years; and they could change a good deal further in the next ten.

WESTERN ARTS AT AN ASIAN UNIVERSITY

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When the Arts Faculty of the University of Ceylon transplanted itself bodily from Colombo to its new buildings at Peradeniya, near the old hill-capital of Kandy, about four years ago, a good many people, both staff and students, regretted the move. What was the point (so went the dominant cry) of leaving the modern capital and burying what should be the intellectual centre of the country in semi-monastic provincial isolation? There was, of course, no one point in making the move; a variety of reasons had long made the step inevitable. For one thing there was a political aspect to the affair. The decision to leave Westernized and commercial Colombo was one way of asserting the University's 'nationality'. Autonomy had already been achieved in 1942, when the University ceased to be a University College and became an independent self-governing body under the Vice-Chancellorship of Sir Ivor Jennings; but the old Colombo buildings, apart from their inadequacy, were redolent of the University College atmosphere. What better means could be found of underlining the University's new identity (to which Ceylon's newly-won national independence added point) than the transfer of the whole organization from Colombo to the seat of the last Sinhalese kings? There was more to it than that, however. Amongst those members of staff, senate, and council, whose interests were predominantly academic rather than patriotic, one governing idea had for years been nurtured and cherished: the idea of creating a true residential university on the lines of the great foundations of the United Kingdom. So far the University of Ceylon had been only partly residential. With the move to Peradeniya, where even students residing in the district are required to 'live in', the dream of a corporate university 'life' seemed at last on the point of realization.

Yet before long, with the kind of ironic reversal of expectation not uncommon in countries finding their national feet after a long period of alien domination, the University, whose move to Peradeniya had been motivated in part by patriotic considerations, became the target of the ultra-nationalists. A residential university? What nonsense! The whole residential principle was a decadent Western importation,

a concession to Imperialism, a threat to ancient Sinhalese tradition, a blow deliberately aimed at the sanctity of the family, and so on. There were other complaints, some merely frivolous, some more serious. No one could argue that the first year at Peradeniya was in every way a particularly happy one. Even if one discounted the vaguer notions of university 'life' and 'atmosphere' (these, one suspects, were largely based upon nostalgic memories of tea and crumpets round the fire in an Oxford or Cambridge study), it remained apparent that a university cut in half could hardly be expected to flourish immediately after the operation; besides, it is something of a commonplace that Science students are often more lively in fields loosely denoted 'cultural' than the followers of Arts courses. The other half of the University is due at Peradeniya in the fairly near future, with the completion of the new Science Buildings. But what of the interim?

'In fields loosely denoted "cultural"': it was the University's seeming lack of interest in such fields that led to some of the more bitter complaints, and impelled one very distinguished person to call it 'a cultural desert'. For practical purposes, 'cultural activities' may be taken to comprehend an interest in literature, drama, music, the visual arts, history, philosophy, sociology, and anthropology: an *active* interest, based upon a conviction that these topics are genuinely relevant in a healthy community, and manifesting itself in the formation of university societies and in informal contacts. Certainly the first two years at Peradeniya gave little enough indication of the right kind of interest in such activities. University societies existed, to be sure, but the main impetus came almost invariably from the academic staff. The Musical Society, depending entirely upon student organization and support, maintains to this day the most precarious existence, while the Arts Society died completely as soon as the lecturer responsible for its foundation went on leave.

One result of this dependence upon the staff was to make the atmosphere of society meetings 'academic' in a bad sense. A talk given to the English Literary Circle or the Curia Historica would tend to be regarded as 'just one more lecture', and the students showed little readiness to take more than a purely utilitarian academic interest in their societies' activities. It followed inevitably that, with one exception, societies concerning themselves with topics not on the academic syllabus received the most meagre support. Nowhere is the notion of university as degree-factory so prevalent and profoundly rooted as in

countries at present or recently subject to colonial administration. A degree is the necessary step to a good 'Government' job, and a 'Government' job is the apex of social ambition. It is hardly surprising, then, that the majority of students, on coming to Peradeniya, regarded talk about 'a corporate University life' with cynicism.

The exception among university societies has always been the Dramatic Society. No doubt the reasons for its popularity are the same as those governing enthusiasm for amateur theatricals anywhere else in the world; but a sharp distinction must be drawn between the work of this Society and the kind of production usually implied by the rather belittling phrase 'amateur theatricals'. That kind of production may be sampled frequently enough in the performances of the small dramatic groups in Colombo and the larger outstations. If, occasionally, such groups have shown real enterprise in producing, however inadequately, plays of a more difficult and unusual nature than those normally encountered in an amateur dramatic society's stock-in-trade, on the whole these societies are content to restrict themselves to 'bright' productions of light London successes. Amateur theatricals in Ceylon began among the colonial British (even today some societies are predominantly European in membership), and although the present-day standard is an improvement on the kind of thing described by E. M. Forster in *A Passage to India,* the attitudes, values, and expectations of both players and audiences in Ceylon still derive all too obviously from those of the milieu in which that notable performance of *Cousin Kate* took place. Amidst this general atmosphere of philistinism the University Dramatic Society has for years insisted on a high standard, even though the standard may not appear very extraordinary when viewed alongside the work of the best dramatic groups at the major British universities. It is practicable to offer Middleton to an audience that values Shakespeare; and a public accustomed to Ibsen and Tchehov will not necessarily find the very different drama of a Brecht altogether preposterous. But what of an audience whose average capacity is represented by *The Man Who Came to Dinner*? Add that that farce was recently sponsored by the staff of one of the most respected schools in the country, and one can appreciate the stand taken by the University Dramatic Society in performing what ought to be such purely routine work as Shaw's *Major Barbara.*

The educational function of the Dramatic Society, then, not merely within the University, but in the country as a whole, can hardly be

exaggerated. The very gradual growth of a public for serious drama may be almost entirely attributed to its influence, and likewise the courageous attempts of other dramatic groups to step occasionally outside the normal routine. A recent Colombo production of Morgan's *The River Line* could hardly have taken place had not the players of the University already suggested, by their own example to at least a handful of the public, that drama might conceivably be regarded as something more than the lightest of light entertainments.

To point out that the Dramatic Society cannot, in the nature of things, be as enterprising as a corresponding body in Britain or the United States is not, however, to say that the plays of Shaw represent its outer limit of daring. The first production after the move to Peradeniya, for instance, was *The Insect Play,* and this undertaking was a landmark in the Society's history. Up to that date it had been customary for some members of the staff and former students of the University to participate in productions; the move to Peradeniya having made the inclusion of the latter impossible, it was decided to cast the play entirely from among present undergraduates, and there can be no doubt that this decision, which undoubtedly did much to suggest to the students at large that there might perhaps be *some* point in the residential principle, has enabled the Dramatic Society to accustom students to the idea of doing things for themselves. And though the great force behind the Society was for long a member of the staff — the former Professor of English, himself a gifted producer — the necessary delegation of production chores to students has developed, over the years, a spirit of independence and personal initiative and a capacity for organization. The result has been witnessed in what looks like becoming an annual event: a dramatic contest between three halls of residence, each hall (entirely without staff assistance) preparing a one-act play, and all three plays being performed in one evening on an improvised stage before a select panel of judges drawn from the staff but invited by the students. Last academic year the students offered a Mexican folk-play, a farce by Anatole France, and the *Electra* of Sophocles — a curious assortment, no doubt, but each production showing remarkable quality in one way or another. If the players were most at home in the farce, the dignity and superb suitability of the set for *Electra,* particularly in view of the difficult conditions, was in its own way much more impressive. Nothing on this occasion, though, rose to the astonishing level of Synge's *Riders to the Sea,* performed the previous year. The

set was a marvel of ingenuity and imagination, nearly all the players were convincing (even the brogue was rendered with commendable realism), while the character of Maurya, taken by a student in her second year, was realized with a grasp and pathos that completely stilled a previously restive audience.

One of the chief developments of the Peradeniya era has been the formation of a University Arts Council. Composed of members of the staff, the Council has been responsible for providing at least two film shows during each week of the term (the inclusion of some purely commercial successes covered the cost of screening such films as *Orphée* or *Les Amants de Vérone*), the purchase of a grand piano, and the organization of piano recitals and chamber concerts by musicians locally available. Such works as the clarinet quintets of Mozart and Brahms have been heard for the first time by scores of students since the move to Peradeniya. From the standpoint of our present discussion, however, the Council's most important work has been the sponsoring of concerts by the University Singers. This body was formed (with little expectation of success) by the present writer in 1953, in an endeavour to remedy the absolute lack of practical music-making among students. Progress was rather slow at first: the music (sacred and secular work of the sixteenth and seventeenth centuries) was unfamiliar; most members were unused to performing unaccompanied; and there was a good deal of curious suspicion on the part of students of certain Christian denominations, who saw fit to disregard the conductor's assurances that his objects were purely musical and persisted in viewing him as an agent of popery. But those initial difficulties were overcome, the Singers worked hard, and in the last two years they have reached a very satisfactory level, giving concerts both in Peradeniya and Colombo. The present repertoire includes works by Byrd, Vittoria, Palestrina, Josquin des Prez, Couillard, Mauduit, and Monteverdi.

As in the case of the Dramatic Society, the work of the University Singers must to a large extent be gauged by its educational value. The story of musical taste in Ceylon, fashioned, like dramatic taste, by the colonial regime, is on the whole depressing. To the majority of Westernized Ceylonese, as to most of their European models, a serious interest in music is neither 'normal' nor particularly 'respectable' — unless, of course, the visit of an international celebrity makes attendance at his recital a matter of social obligation. Otherwise the summit of musical excellence is represented by the Savoy Operas, religiously

performed in Colombo year after year. A nucleus of people genuinely caring for music does exist in Ceylon, and the University Singers are not the only choral body sometimes performing music of the 'Golden Age'. On the other hand they are the only body *consistently* offering such music, and not falling back for the staple of their repertoire on Victorian and Edwardian part-songs, folk-song arrangements, and negro spirituals.

The University Singers have not been in existence long enough to have had much of a direct impact upon the public at large, but indirectly their work is already bearing some fruit: an informed interest in the great polyphonists is beginning to spread to schools and churches. Moreover there is every indication that the Singers should be able to continue as a purely student organization when the present conductor leaves the country.

After four years at Peradeniya, then, the University is showing signs of developing a vigorous and healthy student life. Members of university societies are coming to be less constrictedly academic in their attitudes, and the notion that education involves more than the acquisition of a degree has at last begun to filter through the barrage of prejudice and apathy. In this development the arts of the West have played a vital part, and it is this that may seem surprising in the life of an Asian university. Synge and Monteverdi are taken for granted at Cambridge or Columbia, but what are they doing in Ceylon? What can they mean to a people with so alien a background? Would the students not be employing their time more profitably in attending to the arts and culture of their own country?

Two sets of answers to those questions are forthcoming from Ceylonese of differing outlook: the ultra-nationalist will tell you that Western arts are a relic of European Imperialism, and must as such be swept out of the country as a pernicious evil, while the ultra-Westernized will scornfully protest that Ceylon has no culture of its own worth speaking of. To show how such divided and extreme opinion can be possible among men of education and standing would involve a detailed study of the social history of Ceylon under the successive colonial regimes of Portugal, Holland, and Britain, together with an inquiry into the pressures which have brought about the present stratification of Ceylonese society. It is both a fascinating and a tragic story of racial and religious division, personal ambition, fanaticism, love of money, and pure snobbery, in the midst of which

some enlightenment and a little genius have tried hard to foster a sense of decent proportion.

Similar situations are to be found in other Asian countries which have undergone European rule, but here the process of Westernization has been particularly thoroughgoing — far more so than in neighbouring India, for example. Determination on the part of the well-to-do to follow the European model has led to a complete breach between the life of the larger towns and the mode of living of the rural population. A student with a typical Colombo background, though he has never visited Europe and is never likely to make the journey, will find Oriental literature and music as incomprehensible and uninteresting as they are to the uninstructed European. This was vividly illustrated a short time ago, when the University Arts Council sponsored a recital by a well-known exponent of the *sitar,* only to find that the audience was about one-third the size of that which had attended the last concert of the University Singers. The situation is complicated by the fact that a small but until recently highly influential section of the population, the Dutch Burgher community, is of European descent, with a distinctively European outlook and way of life. Newcomers to Ceylon often make the mistake of associating the Burghers with the Eurasian problem and supposing that they labour under the same disadvantages as, for instance, the Anglo-Indians. That is not the case. The best Burgher families have for years held a highly respected position in the island, and many of Ceylon's most distinguished men have come from their ranks. Since Ceylon's attainment of independence, however, and the consequent removal of official European influence, there has been a tendency in certain extremist quarters to regard the Burghers as 'enemies' of the 'traditional culture' of Ceylon, and to try to humiliate them into leaving the country that has been their home for generations. This policy, unhappily, has had some effect; many Burghers have already found new homes in Europe or Australia, and the recent return of a new government with an overwhelming Sinhalese and Buddhist majority has accelerated the exodus. Yet the names of two men who have done more than most in recent years to stimulate an interest in Sinhalese culture among people slavishly following the West, the painter George Keyt and the late Lionel Wendt (known in Europe as a photographer of genius, but distinguished as a pianist and teacher of music as well as an enthusiastic student of his own country's arts and traditions), are Burgher names. And no one could be more

sycophantically 'Western' than many of the wealthy Sinhalese whose imposing houses adorn the area designated 'Colombo 7'.

To a foreign observer resident in the country, the spectacle is sad and frustrating, for the effects of Westernization have in many ways been thoroughly undesirable. Westernization has more to answer for than a musical taste stopping short at Gilbert and Sullivan. At the best it has certainly brought to a small minority a taste for civilized standards in all branches of living; at the worst it has been responsible for the rapid inanity of a life founded upon cocktail parties, expensive cars, and social scandal. Yet the less desirable aspects of Westernization co-exist with performances of Synge and Monteverdi by university students. After all, one does not expect such interests to be more than a minority affair; can the university not in time educate a small but substantial number of the Westernized public into a taste for the finest in Western art? Is that not more than sufficient justification for the pursuit of Western arts at an Asian university? But, one resumes after some consideration, can the pursuit of Western arts, in the nature of things, be anything more than an occupation for the dilettanti? The Westernized, after all, constitute a minority; why should a national university cater so largely for them? Is it the function of any university to turn out dilettanti? Surely the University of Ceylon should concentrate upon the cultural heritage of its own country, relegating Western arts to the honourable but modest position occupied by Eastern studies at Western universities.

Unfortunately there are serious objections to that seemingly practical and straightforward proposition. For one thing the 'cultural heritage' of Ceylon, though not, as some would like to believe, negligible, is admittedly a fragmentary affair. Ceylon cannot in this respect compare with India, whose traditions have contrived to maintain much more of their continuity. Traditions have, of course, been preserved in Ceylon as far as the rural areas are concerned, as regards the way of life, the cultivation of minor folk-art, and the preservation of traditional crafts and skills; that is to say we have here rather the conditions out of which new artistic creation might spring than any considerable artistic creation itself. Moreover, to encourage the view that Western arts are in some way 'unimportant' would be recklessly to play into the hands of those extremists who are anxious to discredit anything and everything Western, and who would denounce, in the name of 'Sinhalese culture', those material benefits which have given Ceylon a relatively high standard of living among

the countries of south-east Asia. It is well to remember that although India has preserved much of her culture intact, she has not, like Ceylon, banished cholera and small-pox. It is not being perverse or 'imperialistic' (the most common term of abuse) to believe that the arts of both East and West have something permanent to offer, not merely to the countries and continents of their origin, but to the entire world.

Some useful work towards promoting the general world-wide acceptance of such a view has already been done by UNESCO, but something less impersonal than an international organization is needed if the desirability of a cultural *rapprochement* between East and West is really to strike home in a country like Ceylon. Plainly the right intellectual leadership must come from within the country itself, and what body could more appropriately perform that function than the university? Here, surely, is the quarter from which one might expect that balanced, mediating guidance so urgently necessary for the country's cultural health; here, if anywhere, one might look for a mature superiority to religious, communal, and political differences, in the co-operative dedication to a common purpose. How far has the University succeeded in fulfilling this office?

In attempting to answer that question, I propose to take my examples from a field that has not so far been directly mentioned in this discussion: the field of literary studies. The University of Ceylon possesses a small but go-ahead English Department, in which the approach to literature, since the University's assumption of independent status, has placed its emphasis (with due awareness of the dangers involved) upon stimulating a lively and discriminating response to the printed page rather than acquiring a minute and laboured textual knowledge.[1] Though at present, largely because of political developments, English is not one of the most popular subjects at the University, quite a few candidates still offer it for the entrance examination, and of those a fair proportion read it for the General Degree, while a select minority, who attain a Second Class or higher at the end of their first year, are allowed to proceed to the Special course. It must be admitted that the motives of many students (and this goes for most of the General candidates) for choosing the subject are not of the purest. Some look upon it as an easy option, success

[1] Some account of the courses offered will be found in the present writer's article 'English at the University of Ceylon' in *The Use of English*, Vol. VII, No. 4.

being a matter of picking up a few odds and ends of critical jargon and acquainting oneself with one or two stock reputations. Others choose English for the snob-value still attached to it among the Westernized. In a normal 'respectable' person, to have 'done English' at the University is regarded as a genteel accomplishment, like the ability to play a handful of pieces on the piano, and if the person in question is a young lady it will substantially increase her value on the marriage-market. Even with Special students, though a genuine interest in the subject may be assumed, the snob-approach cannot be altogether discounted; they are 'a select minority', and it can hardly be doubted that some of their pleasure in reading English comes from their sense of belonging to a finely sifted community. Such a feeling of exclusiveness, in the conditions of present-day Ceylon, where it inevitably links up with communal and social rivalries and resentments, has not helped to make the English department popular with the rest of the University. And when it is further mentioned that, with a few exceptions, the average Special English student makes no secret of the fact that to him non-Western literature is beneath contempt, it will be appreciated that the most acid criticism comes from the departments of Oriental studies.

The situation in the University, indeed, reflects the unhappy tendency in the country as a whole to suppose that an interest in the arts of the West is incompatible with a concern for those of Asia. It has been justifiably pointed out that the Oriental departments, though catering for a very large number of students, do not for some reason appear to receive the same official recognition as other departments. Why, it was asked some time ago, should there be a distinction between the 'Arts Faculty' and the 'Oriental Faculty'? Does this not imply that Sinhalese and Tamil literature, for instance, or Buddhist painting and sculpture, do not qualify as 'Art'? When the country is in the midst of a national revival, when all endeavour should be directed towards consolidating those traditions that have survived from the past and fashioning for the future a new way of life which can be called distinctively Ceylonese, what is the *use,* returns the old question, of studying English literature? The average Special English student will retort that of course there *is* no 'use' as such in what he is doing; it will not take him anywhere materially, unless he goes on to teach the subject at school — though he will try to avoid the poorly remunerated profession of teacher, at any rate as a permanency, and seek a post in Government service, where he will be doing work very

far removed from his subject. He is content, in fact, to regard himself, and to be regarded, as a dilettante.

Every year, fortunately, there are to be found one or two students willing to take another view. The 'use' of literary studies is twofold: to stimulate and nourish the new creative writer (rare though he may be), and to maintain an audience both for the literature of the past and for the new talent if and when he appears. Now in Ceylon the new creative writer will assuredly not use English as his medium. In the past a number of Ceylonese writers employing English have found their way into print; at the best they are without distinction, at the worst abominable, with very occasional exceptions like a young poet who has recently published a volume in England, though his genuine and sensitive accomplishment plainly belongs inside the English tradition. Any attempt at serious creative writing in the future will be in Sinhalese, and will most likely concern itself with topics peculiarly relevant to Ceylon's present critically transitional phase. A certain corpus of modern writing in Sinhalese does already exist. Some years ago one of the University's most distinguished and broadminded scholars produced a book on the Sinhalese novel. For the most part it makes dismal reading, a tale of tawdry chauvinism, sensation-mongering, and shameful cheapness of appeal. If the example of Hardy here or Tchehov there has momentarily raised the level, the most usual Western influence is that of the best-seller at its worst. As the author points out, this was the price inevitably paid for the emergence of any Sinhalese fiction at all; when the possibility of such a thing as a serious modern Sinhalese literature was laughed at by most of the educated, it was natural that pioneering novelists, left to their own resources, should adjust their appeal to the only kind of audience prepared to take any notice of them. The wretched quality of the Sinhalese novel was a direct result of the indifference and contempt of the 'educated'. The one or two recent novels and short stories that have reached at least a decent standard, have been made possible by the extremely gradual appearance of an audience familiar with the best in European and American fiction, who are willing to take a serious interest in Sinhalese writing, and to bring to it *and require of it* something of the standards they have absorbed from Jane Austen, Dickens, George Eliot, James, Conrad, and Lawrence; an audience, that is, who effect the very *rapprochement* so vitally needed. This audience is still far too small, and it is expanding far too slowly. For that we must blame extremists on both sides; those

who cherish the dream of a self-sufficient Ceylon swept clean of the baneful influence of the West, and those who feel that the possibility of a modern native literature is really not worth bothering about when the West has left so rich a heritage. As a result the cross-fertilization of East and West has been hindered and the position of those who can see value in the achievements of both has been an isolated and difficult one. And this despite the triumphant illustration in the painting of George Keyt and Justin Deraniyagala that a cross-fertilization has been abundantly beneficial where the visual arts are concerned.

The University cannot be entirely absolved from extremism of one kind or the other. In so small a country, where the University mirrors non-academic trends more widely than would normally be the case, that is probably not to be wondered at. But there are encouraging signs that the situation may improve with reasonable speed. Apart from the salutary example of individuals on the staff, there is the evidence of student feeling and activity, and it is the temper of its students that really determines what a university is to become. Some students doing Special courses in Sinhalese have chosen English as a subsidiary, while others, if not actually going so far, have begun to read widely and to take a lively and discriminating interest in European and American literature. Moreover, and this is the most heartening evidence, the student interested in Sinhalese literature is often one whose work in English is of a particularly high quality. One student who recently obtained a First Class in English is now researching on Sinhalese folk-poetry, besides taking an intense interest in contemporary Sinhalese writing. Though few in number, students of this kind are bound to be influential. They make it hard for the more average Special student to preserve his characteristic attitude of complacency, and it is to be expected that this will finally disappear completely. In thus fostering the growth of a discriminating audience for Sinhalese literature, the English department will be performing a highly valuable service to the cultural well-being of the country. And with the more equable spirit of co-operation which the better students in both Western and Oriental departments must inevitably bring about, the University as a whole should come to discharge its office of enlightened leadership in a manner appropriate to the intellectual centre of the country.

MR. MAYHEAD AT AN ASIAN UNIVERSITY

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I TAKE IT that Robin Mayhead's article may be understood in the main as having two parts. In the first he demonstrates, through a discussion of the place of musical, dramatic and film-going activities in the Peradeniya section of the University of Ceylon between 1953 and 1956, how in his view the University is influenced by prevailing social standards on the one hand, and how, on the other, it can perform an educational function in Ceylonese society which is more than academic. In the second part he asks how the arts of the West can play a significant part in a country in which he sees an anti-Western nationalism being opposed by an anti-traditionalist Westernism. He goes on to suggest that the University of Ceylon has started on the task of *rapprochement* between East and West, and should be encouraged to continue.

I hope that I have got correctly the gist of Mr. Mayhead's thought. I readily agree with some of its implications, indeed go so far as to say that in Asian Universities the place that should be given to the Western arts should be near (if not at) the centre of the University's contemporary role as a creative intellectual force. As a Ceylonese nationalist I find the article valuable as recording the candid impressions of a friendly visitor, whose taste in drama, literature and music is a reliable guide to what is valuable in European culture. In other words, I shall be happy if increasing numbers of my countrymen learnt to enjoy the drama, music and literature that Mr. Mayhead values highly. What he says supports the work of a few Ceylonese who have for some years been working towards that end through broadcasts, writing and personal contact.

His article, however, makes several assumptions and judgments which lead beyond the limits of a tentative case-study of the reactions of a few undergraduates to European drama and music. Some of these assumptions are either insufficiently tested or more controversial than Mr. Mayhead evidently believes. He assumes, for instance, that he has studied proper samples, that the schoolmasters who produced *The Man Who Came to Dinner* represent in taste and discrimination the teachers of all the leading colleges; that the practice in regard to cultural traditions in Western universities is not a kind of provin-

cialism, a failure to see humanity in true perspective; that no body can better give the right kind of intellectual leadership in Ceylon than the University of Ceylon; that Ceylon is unfortunate in not having the kind of 'continuity' of tradition that India appears to have. All his assumptions and judgments cannot be commented upon here. But it needs to be said that the first six paragraphs are somewhat sensational and likely to mislead as an adequate explanation of the facts. I believe that in some instances Mr. Mayhead has been misinformed, seriously enough for the arguments based on the mistaken facts to be invalidated. For example, it would make some difference to the reader's perspective to keep in mind, as he reads Mr. Mayhead's article, that the Ceylon University Dramatic Society is about twenty-five years old; and that there were in the period 1942 to 1952 in Colombo good, bad or mediocre (but enthusiastic) amateur productions of plays by O'Neill, Pirandello, Sean O'Casey, Brecht, Shaw, Bridie, Anouilh, (several by) Shakespeare, and the Sanskrit *Little Clay Cart* (I write from memory, and exclude school, training college and broadcast performances, as well as theatrical entertainments by the European groups). It would also make a difference if it is remembered that there are not a few Ceylonese who (quite independently of the University) enjoy reading Henry James, Dostoevsky, Eliot, available translations of Indian, Japanese, Chinese or other Oriental literature; who listen to or perform classical Indian music, Bach, Purcell, Byrd; who passionately enjoy *Bharata Natyam* and Kandyan dancing. In painting there are not only painters of considerable stature like Daraniyagala and Keyt, but some excellent work is being done from the primary departments of schools by the 'Forty-Three Group'.

It is also important to keep in mind the mechanical and economic difficulties: the champions of vulgarity and trash are in the centres of publicity and the seats of power — in politics, in the administration, in the mass-communication media, in education; in a tropical climate one has less actual leisure than in a temperate, and it does not help when schools and offices slavishly keep the same hours as obtain in Britain; books, pictures, concerts, records are, in relation to food, much more expensive than they are in England or the United States; amateur performances of music and drama and dance are often slipshod and sloppy, but they involve financial loss because of taxes and rents; good public entertainment has to compete with the publicity of the film industry. None the less there are many intelligent Ceylonese

who find the cultural life of Ceylon exciting and challenging, and would regard the University at Peradeniya as an ivory tower.

Mr. Mayhead is, however, one of the first visitors to Ceylon to pose some important and searching questions which even among the Ceylonese have too rarely been asked. The persistent asking of questions of this kind — about the function of the arts in society, for instance—is a service to the university in Asia. Mr. Mayhead, we notice, goes on to answer some of the questions he has asked. This I wonder if *anyone* is yet qualified to do. Visitors have in the past rushed into print with generalisations about Ceylon, on subjects on which the prerequisite corporate study had not been done, or even attempted. I hope that Mr. Mayhead has not been influenced by these superficial reports, for they are of negligible use.

The people and culture of Ceylon will need, like the people and culture of any other country, many years of first-hand study before they are understood, and before a proper scheme for popular description can be invented. It is not for form's sake that I am diffident even about the ability of the Ceylonese to know what exactly is happening in Ceylon. Those of us who have grappled with the problems of national purposes and responsibilities in a time of rapid social change have found ourselves involved in some of the most baffling sociological and philosophical problems. And modesty should not prevent us from saying that if we find them baffling, it is not for want of scholarship, interest or intelligence. Individual thinkers and scholars can work only in a tradition of critical study, or blaze their own trail. Ananda Coomaraswamy (who could not find recognition or freedom for his work in his country) was perhaps the only Ceylonese of our time who threw some light on the sources of our difficulties and confusions. Men and women of resource and imagination are needed, who will pioneer in extending the bounds of our knowledge of 'the East' — once 'mysterious', now denied even the inscrutability which is part of humanity, if one is to judge by the things that journalists write and say about Asians. Today anyone who hopes to say anything significant will, I am sure, have to go beyond what Coomaraswamy was able to achieve. But he will have first to equal him in range of scholarship, insight and talents, and in the clarity of his convictions. Even as I write this I wonder if these are times for stock-taking and reflection; should we not bear in mind that everywhere it is original and creative intelligence that is in short supply, whether it finds its expression in fictional or discursive writing, poetry or polemic, painting or musical

composition, politics or engineering. In every field of action Ceylon is dominated by mediocrities. Men and women of unusual abilities must be taken into account, even if they are eccentric. It is not by the mediocrities that a society is fairly judged.

Mr. Mayhead is too confident in the way he makes, on the basis of a meagre assortment of reports and personal observations, his several sociological, historical and moral judgments on and prescriptions for a 'dynamic' situation. I do not question his accomplishment in European and American literature and music; nor his serious concern for the values of Western civilisation. He wishes his students to show a less calculating interest in drama and music than they do, and to feel more responsibility for the growth of Sinhalese literature. But I wonder if his whole approach makes necessarily for sound scholarship in sociological studies of this kind, or for a state of mind which can sympathetically or empathetically study a civilisation whose traditions are mainly non-Western in origin and of great antiquity: a society with its variously directed and complex lines of development and decline, its newer grafts and dead branches all seemingly inextricably intertwined; and yet needing to be cared for and cultivated.

It is not that I accuse Mr. Mayhead of wanting in seriousness or sensibility; from his article it appears that his sensitiveness and concern is limited to only some things in the total situation of which he is writing. I mean to claim that to be realistic in any discussion of the cultural problem as it affects the people of Ceylon, they must be visualised in actual situations. The university at Peradeniya not only has interconnections with the rest of society (family life, industry, social groups, professional life and so on) but has to have some foundations in the world of learning and the life of the intelligentsia; only a small part of whose total life it can, as a single, localised institution, focus and express. Ceylon is in a sense unique in being a community of indigenous groups which live by one or another of the world faiths of our day — the Buddhist, the Hindu, the Christian, the Muslim and the Marxist. It is one of the cross-roads not merely of trade and travel but also of the commerce of ideas and ideologies.

Already the intelligentsia, awakening, as it were, after a spiritual torpor of hundreds of years, is trying to cope with the emotional and intellectual challenges of a time of rapid social change. It is not necessarily a disadvantage that Ceylon lacks the cultural homogeneity and conservatism of India. Life can be very exhilarating and exciting to someone who does not try to escape from the present. We must

imagine, say, a devout and sensitive Buddhist girl from one of the more provincial villages reading *Hamlet* or *King Lear,* or seeing *Les Enfants Terribles*; a third or fourth-generation Christian rediscovering the appeal of the *Bhagavad Gita* or the *Tripitaka,* or caught by the hidden power of *Bharata Natyam* or of the sculptures of Anuradhapura; the peasant cultivator faced with the necessity, if he wants to be able to afford two rice meals a day instead of only one, of overthrowing through the ballot the intangible obstacles which an all-pervasive, monolithic, anonymous state has placed in his way; his children trying to be clear about the dangers of parliamentary democracy, and seeking the personal equipment which is a prerequisite for effective participation in public life. I can think of possibilities with more exciting implications: people trained in the ancient traditional scriptures and literatures who try to interpret Keats, or Kierkegaard or Heidegger; the attempt to work out a theory of natural law in terms of *Dharma, Dhamma* and other related concepts. It is challenges like these that stimulate thinkers to strive for fresh insights and original scholarship.

These are not, of course, the concern mainly of the University of Ceylon. They belong to the *University* in the larger sense of that term. By the *University* I would suggest something more than the institution of higher education that the countries of Asia have inherited from the West. It no doubt includes only adults with at least some basis of formal general education suitable for adult life; as well as those who teach and those who learn. But in a plural society, that which gives all this activity form and integrity is surely important. I would say it is the disciplined, respectful and critical discourse which takes place about common business and common ends; in this way the various personal and traditional values and concepts are criticised, recreated and refined. Where this process is most significant is in the reforming and reconciling of concrete presuppositions and distant aims, for it is these that lie outside the range of everyday life, and yet are basic to the life of any society. They must, in any healthy society, be continually the concern of the intelligentsia. Otherwise faith becomes superstition and devotion to ultimate purposes becomes fanaticism; and knowledge becomes dead. The discourse of which I write takes place in lecture halls, seminar rooms, private studies, libraries, serious journals and even in some radio programmes. Perhaps it also takes place in the theatre, the cinema and the concert hall. Life is to be lived by all. But it appears as if there are only some who through the

intellect and imagination can rehearse the drama of living. I may be wrong in all this, but as I understand what is happening, I see no point in talking about the study of English Literature in the University of Ceylon unless the talk presupposes at some point a clear and realistic notion of what the pursuit and responsibility of higher-learning-in-community means for Ceylon this year and the next.

Mr. Mayhead has slurred over some of the really troublesome questions. It is true that many undergraduates are selfish, mercenary and vulgar in the way he describes, yet they are officially the 'good' men and women. But there are many who are intelligent and civilised but who reflect the confusion of the country as a whole. They are not to blame. The conditions of life are confusing, and if there is anyone in the University of Ceylon who is capable of leadership he is certainly working underground. The University faculty is not to be blamed for not providing creative leadership of the highest order. That is not their job. Many of them are doing valuable research in their special fields, and are good teachers; some of them, as in all other universities, are neither. What is more immediately to the point is the fact that a few of them who have the ambition of influencing thinking on public issues have either helped to make it drily academic or have prostituted whatever learning they have in the service of racialist, communal and totalitarian movements. Some of their colleagues evidently do not have any regard for them, but the liberal forces within Peradeniya are weak. If the University of Ceylon is as badly racked as Mr. Mayhead suggests by trivial rivalries between fanatical devotees of this or that provincial literature or tribal culture of the past, so much the worse for that institution. I take it as axiomatic that culture and education are concerned with the living, not the dead. The University of Ceylon, by Mr. Mayhead's own showing, is both unsuited for the leadership he wants it to assume, and unrepresentative of the *University* in the broader sense given earlier.

Some of my disagreements are legitimately matters of faith and hope. Mr. Mayhead may disagree with what I say, but he has not taken into account the views of those who think like me — those who do not regard the ultra-nationalist and the ultra-Westernised as representative of the intelligentsia. That the University in which he works is not *the* intellectual centre of the country but only one of the intellectual centres I could demonstrate quite effectively if it were necessary. But here I will only say that what Mr. Mayhead reports in the last two paragraphs of his article is only a small part of what is

actually happening. If Peradeniya is ignorant of or out of touch with the creative cultural life that goes on in the rest of the country, the worst fears have been confirmed of those of us who opposed what might have turned out to be an ivory-tower or a convent.

Supposing we take even the limited definition of 'culture' that Mr. Mayhead gives us in his third paragraph. Some people may find it disturbing that the University of Ceylon itself does not take it seriously enough to have independent departments of Sociology, Anthropology, Ancient History, International Affairs, Music, Far Eastern History, Architecture, Comparative Religion, Indian Languages and Literatures and several others that one would find at Cambridge or Yale or Calcutta. But this may not seem to be important. We may then ask: if cultural activities mean an active interest in the subjects specified, *whose* sociology, literature, drama, music, painting, history or philosophy should a Ceylonese be interested in? Even in Western universities (outdated as they are in their conception of human civilisation as being predominantly Western) we don't find British students concerned only with things originating in Britain, American students concerned only with things originating in the United States. But let us again suppose that 'East' and 'West' *are* valid labels, and that a university is a nationalist agency.* But what does national culture mean in Ceylon (or Malaya or Burma)? There are Sinhalese-speaking, Tamil-speaking, English-speaking, bilingual and trilingual persons whose ancestors have been in the land from prehistoric times. There are Buddhists, Hindus, Christians, Muslims and Marxists, besides others; and people who live by a particular faith want to study other systems of belief both for 'cultural' reasons and in order to understand the lives of their neighbours. I am now not writing at all about recent immigrants or missionaries but about the natives. I am also excluding for the present the local Indian community of nearly a million, who I believe are citizens. In a particular house, say, there will be a Buddhist, and five Christians; one person speaking only Sinhalese, one Tamil and English, two Sinhalese and English, and two being trilingual; two of the Sinhalese-English speakers are racially classified as Tamils; of the two trilingual one is Burgher and one Tamil; Sinhalese and English are the most-read languages; since the total active interests include all those listed by Mr. Mayhead as well as several of the sciences, English is naturally the most used for serious

* I should have thought that the very conception of University is supra-political and supra-national.

reading and discussion. I could go on, but I want to illustrate from an authentic example of a Ceylonese household the fact that community life is inter-religious and transcends ethnic and linguistic groupings. (I personally would like to see a new common Ceylonese literature emerge in a common and enriched Sinhalese language, but I know that those who do not agree with me that Sinhalese should be the common language have arguments which I cannot answer and claims of justice which I cannot ignore. I expect that truth and justice are more important than anybody's longing for simplicity. I notice that in his penultimate paragraph Mr. Mayhead takes a different view of the facts.)

A number of Ceylonese would feel that they did not care about labels as long as good literature was being written. We certainly do not want an academy which decides how and what and in what 'medium' anyone should write. Let people write, and if they are good *they* will decide what we will read. What people concerned should do is perhaps to be vigilant against the public's being victimised by publishers' rackets. Professor Ludowyk rendered us all a great service by freeing literature from the domination of philology and literary history. This happened in the pre-Peradeniya era. There are people who read critically, and there is some fairly good reviewing. What is very bady needed, in my view, is the creation of a number of independent centres of thought and study, to carry on what I tried to define earlier as the work of the *University*. They will have to be inter-disciplinary and inter-cultural, and not primarily concerned with degrees and diplomas.

The University of Ceylon stands, along with the University of Malaya, for certain standards of academic accomplishment which are unusual in Asia. Its entrance standards are high, and so are its degree requirements. Some of its faculty are scholars who will compare favourably with their counterparts in any other university. But what, in Ceylon such as I have described it, can a single state-sponsored and monopolistic university, situated in the easy retirement of the Peradeniya campus, achieve? What can it do to create the intelligentsia that Ceylon needs? I am thinking of those qualities without which a country cannot remain civilised: a respect for learning, a keen social conscience, a delight in pursuing serious intellectual and moral interests in association with others, a desire (perhaps fostered by only some social traditions) on the part of those unusually gifted in intellect and imagination to fit themselves to serve the community in the best

way they can. A responsible university in this sense of the term is rare in any country. Mr. Mayhead seems to take it for granted that if things have been wrong, it was the public and the students who were mainly to blame. He does not say whether the formation of Arts Councils and Societies are mere gestures, or fit in with the whole scheme of university life — whether they encourage all students to be alive to social issues, treat them with respect as intelligent adults, assess the quality of their total accomplishment rather than their performance in the examination hall. Or does the University rather want them to 'appreciate' Swift and Jane Austen while esteeming the characters that they satirized?

But I return to my question if 'the intellectual centre of the country' can be created by a legal monopoly. It was the determination of the first Vice-Chancellor that the University of Ceylon would have a monopoly of public funds for university education and of the right of conferring degrees. Independent colleges can exist only if their students will accept diplomas or be prepared for the external examinations of the University of London (whose requirements naturally were not intended to meet the needs of the Ceylonese intelligentsia). Of course, Ceylon has been saved the low standards of the Indian universities and the unfortunate Filipino university situation. But it is inevitable that a unitary system prevents the University's being shaped by creative social forces, tends to make its thinking inflexible, encourages an intellectual tyranny and orthodoxy. I cannot see how intellectual freedom can thrive if there is only one institution of higher education which cannot be challenged or competed against.

Except for a few of the research laboratories of the government, and the archæological and museum departments (which have their own peculiarities), the only places from which the standards and orthodoxies of the University can be challenged are the (London) university colleges and a few struggling and private attempts at research and publication. Potentially, there is another source of independent study and research, which is very possibly the basis of an as yet unrealised diversity of structure and emphasis in higher education in the country. I am referring to the 'collegiate departments' of the best colleges. These are generally staffed by graduate specialists who give two-year courses for the University Preliminary, Higher School Certificate, General Certificate of Education (Higher Level), the (London) Intermediate Examination in Arts, Science or Medicine. In spite of the most discouraging conditions (insufficient pay; the tie-up

in organisation with elementary, secondary and high school; unimaginative principals; lack of necessary leisure for study; narrowly conceived syllabuses; and so on), many of these men and women are teaching what is the equivalent of first- and second-year undergraduate work in hundreds of universities. They would be, in American terms, junior college teachers, taking freshman and sophomore work. The cost of additional study for the ablest of them, the extension of existing libraries, laboratories and lecture rooms, and the raising of salary scales could be one way of creating independent centres of higher education.

All this would seem to be a digression from a comment on Mr. Mayhead's article. I have tried to indicate the immensity of the cultural problems of Ceylon, which he has chosen to diagnose. It is for the intelligentsia to find ways of being creative in *contemporary* terms. The work and leisure activities of even the educated are part of the ritual of daily life and of society. 'The Western Arts' are involved with public habits and taste, which change slowly.

Until we are clear what we are about to do, what is happening to us, where we want to go, how to reconcile the demands of the various groups of the natives of the country, we cannot say what the immediate function of the *University* in Ceylon is. The university is not, in my view, a changeless institution, whether we take it to be a particular institution or the whole structure of the world of learning. It must change in different times and circumstances if it is not to become an anachronism or a misfit. I cannot, for want of space, demonstrate my conviction that at the moment there is in Ceylon the co-existence (not peaceful) of different kinds of intelligentsia — ranging from the priestly élite to the mere 'intellectual'. They have conflicting conceptions of the role of education, and they represent different stages of the past evolution of the people (or peoples) of the island. Two books which may elucidate my meaning come to mind: Florian Znaniecki's *The Social Role of the Man of Knowledge* and Karl Mannheim's *Essays in the Sociology of Culture*. I do not assent to everything they say, but I should like to suggest that their discussions are relevant to Ceylon and other Asian countries.

(*It is hoped that Mr. Ludowyk, until recently Professor of English at Peradeniya, will comment on this discussion in the next issue of U.Q.—Editor.*)

THE EDUCATION OF A TECHNOLOGIST

SIR,

In the symposium on the education of the technologist in the February issue of the *Universities Quarterly,* it is a little surprising that only one of the three articles is by a scientist. It is true that Mr. Norwood Russell Hanson achieved considerable fame last year by his B.B.C. talk, to which he gave the provocative title 'On Educating Physicists' and in which he made it clear that in his opinion there is something amiss with the physicists he comes across at Cambridge. That talk, even if we didn't agree with some of the arguments or the conclusions, many of us found encouraging, especially those of us who have been concerning ourselves with the problem of how science can become the integral part of our culture that the humanities were in the past. In his recent article Mr. Hanson goes a good deal further in developing his ideas about the education of the technologist and of the scientist generally, and we ought to be thankful for his persistence. He comes out strongly in support of the idea which was independently put out by some headmasters a few months ago: that it is possible to make science more widely educational and cultural if the specialist subject is made into a sort of focus to which many other subjects are naturally related. He realises that the scientist is most likely to be interested in philosophy, logic, history, the study of concepts and the understanding of what he is doing, if these other subjects radiate naturally. And he quotes once again, and defends, Sir Eric Ashby's entertaining account of the cultural value of Brewery as a university subject.

That the scientist whom Mr. Hanson discusses would be in a multitude of ways more aware of what he is doing and of himself is quite clear. What is not so clear is that the methods he suggests would be in themselves sufficient to produce an educated man. The other two contributors, Professor Pilley and Mrs. Dorothea Krook, disagree vigorously at this point — I should say too vigorously. They try with some success to answer the question of what we mean by an educated man. They also take Mr. Hanson to task for failing to answer, or to expose the implications of, his own question: 'How much are we prepared to give up to remain a world power in the scientific and technological field?' He shows, in this question, that in his heart he feels that the demands of the modern age may produce a world that is not in the highest sense worth living in — 'worth' in the true sense

that it would lack the essential values. Many scientists would probably disagree with him and assert that we should only lose if we fail to keep up in the technological race. Professor Pilley and Mrs. Krook would have had a tougher task if they had been replying to a man who argued wholeheartedly and logically for the maximum emphasis on technology as a good thing in itself.

Their opposition to Mr. Hanson is two-fold, partly negative in their refutation of his views, partly positive in the alternative suggestions they seek to justify. They point out the weaknesses in Mr. Hanson's (probably) excessive emphasis on education as consisting largely in the 'extension of the frontiers of knowledge'. This conception of education is far too common — as if it were necessarily a good thing to extend the frontiers of the kind of knowledge which science gives us or as if that knowledge were the only true knowledge. For in what sense does the scientist 'know' his subject matter? What is it that we know with the knowledge that physics, for instance, gives us of matter, or the chemist of life? The lens of science (Mr. Hanson's phrase) does indeed, as Professor Pilley says, produce a distorted image of the world and of humanity, and there is a real danger that the picture that man in the end produces of himself will be something very much less than human.

It is refreshing to find Professor Pilley and Mrs. Krook so roundly asserting the primary value of the humanities. There has been far too much defeatism among the humanists lately, and they are surely right in demanding that 'a good proportion of first-class minds must devote themselves to the humanities as their main study'. But it is surely little more than an *ipse dixit* when Professor Pilley claims that without this 'the humanity and deeper morality of a technological society would suffer calamitously' and that without 'enriching the sources of literary tradition social ethics will have nothing to draw on for sustenance'. Scientists would not agree and would agree even less with the statement that we 'must teach the scientifically specialised part of the nation how to sustain itself from these sources'. And he would find it hard to convince his opponents that 'the understanding of *things* has its origin in the imagination and that this imagination is secondary to that through which we come to understand and share a common life with other people'. That may be true, but Professor Pilley is far from having proved it.

He and Mrs. Krook both insist on the need for a study of literature and the interpretation of texts as fundamental to real education. Yet

this proposal is in practice almost impossible of attainment and in principle difficult to establish. As far as the schools go, headmasters would willingly find the two hours a week desired by Mrs. Krook for her study if they thought it practicable; but she must have little acquaintance with schools as they are, with the capabilities of teaching staffs as they are and with the temperamental attitudes of most boys who are doing science. Just as when she comes to discussing the fine arts she admits that men like Professor Pevsner are not to be had for the asking, so men able to teach English in the way demanded, whether at the university or school — so that we could achieve the enlargement of the mind and the refinement of the sensibilities which in her view constitute much of the value of education — must be proportionately at least as rare as a black swan. Headmasters would agree with their view that any increase of 'liberal education' in the schools is difficult until the universities adopt entrance requirements which give more enlightened help in laying sound foundations; and in this respect the faculties are perhaps worse offenders than the universities. Even with more such help, even with a sound scheme, even with some of the necessary staff, there is the further obstacle of a curious (apparent) increase in the child-population of what has been called 'language-resistance'. Boys are no longer interested in words, except perhaps in the game of increasing 'word power' as manifested in *Reader's Digest*. Their vocabulary is limited, their sensibility to language even more so. The whole of our social climate seems to be opposed to real feeling for language, and our professional philosophers, the logical positivists and even the linguistic analysts, for all their passionate interest in the study of words and the use of language, disregard the real life of the word and all life and spirit have gone from their study. Mrs. Krook's methods could not have much success unless we can awaken in a substantial number of children the interest and delight in words such as the best classics of the past displayed, and unless we can persuade especially the scientists that their English periods are not a burden to be endured (if at all).

But even admitting that the study of the humanities is vital and that some such scheme as Mrs. Krook puts forward might be part of such studies, can we really believe that this is what we need? Can it, for instance, be shown empirically that men at the universities who study and teach English are better men or better educated? Are the Cambridge First Class English men the best products of their university? Do they show that enhanced sensibility, intellectual, æsthetic,

imaginative, moral? The problem of educating the technologist is much more complex than Mrs. Krook appears to see, and only a much more widespread attack can hope for success. Both man and the world are enormously complex, and simple remedies like hers are quite insufficient. A mixture, even a conglomerate, of solutions may have to be necessary: that there should be the sort of change in the specialist studies that Mr. Hanson suggests, that there should be an effort to recreate the deep interest in the humanities, that there should be more thinking about the meaning of education and about the values in society and in life which we set before us. It might even be wise to remind ourselves that much of the problem may have to be solved *ambulando*.

One may perhaps add a comment on the many suggestions being made nowadays for the improvement of the education of mid-twentieth century man: neither technology and science, nor literature and philosophy, can do the job unless they hold a right view of man and matter. The root of the problem therefore is religious. The scientist must not accept the knowledge given through the lens of science as being more than a fraction of real knowledge; he must add to his piece of what he calls knowledge at least the aspiration towards the sort of knowledge of which St. Paul speaks in the famous chapter of *First Corinthians,* when we shall no longer see as through a glass darkly. In the same way the literary critic, however far he may go in the development of sensibility and discrimination, will not touch true knowledge unless he brings the word of the poet he is studying into some sort of relation with the 'Word that was with God'. Education and culture, as Professor Pilley and Mrs. Krook see so clearly, are unattainable unless somehow based on the use of the imagination and study of real language. But we need from them something much more convincing than they have given us. Otherwise, to expect the study of texts, in the world as it is, to have any substantial influence on the education of the technologist is to be crying for the Waters of the Moon.

Yours, etc.,
E. H. GODDARD.

Headmaster,
Haberdashers' Aske's Hatcham Boys' School,
London, S.E.14.

REVIEWS

Robert Hooke. MARGARET 'ESPINASSE. *Heinemann.* 21*s.*

Mrs. 'Espinasse disarms us in the first sentence of her preface: 'It may be supposed that the life of a great and controversial figure in the history of English science ought to be written by someone with a scientific training. I am aware of my disabilities, and I should not have dared to undertake this book but for the encouragement of Dr. J. Bronowski.' Now Dr. Bronowski, I am sure, would wish to disclaim any credit for Mrs. 'Espinasse's success and yet take responsibility for a measure of the failure of the book. He could do that with safety. Because — which is curious to remark — the success of the book is personal, its failure impersonal. This is a consequence of the special character of scientific biography. We know there are fashions in ways of writing the history of science. What about the history of scientists?

Scientist is not a very good word. We all know what we mean by *scientist* here and now, and that is the trouble. If we are to write the life of Hooke (or of Newton or Vesalius or Lavoisier or Darwin) we must exercise great reserve in transferring to his person, his personality or his epoch, those factors which make the scientist of our day a more or less recognisable species.

A recent White Paper on scientific manpower equated the term scientist with 'a man or woman trained either in fundamental or applied science to the level of a university degree or the equivalent qualification'. That definition does not in the least fit the conditions of Hooke's day. There was no 'training' in science to be had; the teaching of mathematics and astronomy at the universities can hardly be counted as a preparation for a life devoted to those subjects. Medicine was, as for long after, an important introduction to science but hardly a scientific discipline. There was no distinction between pure and applied science. It is true that the Royal Society, pursuing the Baconian thesis, preached the application of science to the arts and trades, but this is not to say that any separate discipline of applied science was recognised or contemplated. And it would have been quite impossible for the seventeenth century so to assess competence in different disciplines as to be able to point to the 'equivalent' of a university degree in any other field. Hooke, by the lights of this twentieth century definition, was not a scientist, nor was Newton or any other member of the Royal Society, yet they are in the direct

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line of the scientific tradition which is inherited by the scientist of the official formula.

This transformation is well recognised elsewhere. The political historian has learned not to examine, say, a seventeenth century member of Parliament as if he were a twentieth century member. The biographer of a political, artistic or literary figure of any period since the Renaissance can expect a majority of his readers to react sensitively to a considerable repertoire of reference and allusion. The biographer of a scientist can have no such confidence. He may succeed in communicating with his conventionally literate readers so long as he is dealing with those unexceptional features which make up the bulk of any life, any personality. When he comes to his subject's significance as a scientist he loses touch, because the power of allusion in the scientific realm is denied him.

The disability to which Mrs. 'Espinasse admits would seem to go further and to deny her the power of scientific allusion, to prevent her writing between her own lines. All the same she has done one worthwhile thing. In writing of the scientific societies of the seventeenth century, she has captured the 'life of science' of the period and she has had the luck, good judgment or good guidance to see the part that mattered: Hooke could not live without the Royal Society.

There are many scientific societies today, but their members stand in the same relation to them as did Hooke, deriving from them continuity and justification. It is not enough to think of the learned societies as a subsidiary feature of modern science. They are the world of modern science. They began with it and falteringly matured with it in the seventeenth century, becoming its chief organ of nourishment and survival when they allied themselves with the brilliant social-invention of periodical publication. Other branches of learning have found their natural milieu in the universities. Science on the other hand has grown up largely through research institutions, even succeeding in establishing them within universities where they have developed a life of their own, in many ways foreign to the character of their hosts. Once the student has graduated and entered the scientific community at large, his involvement in his learned and technical societies will be the more intense the greater is his capacity and the more complex are the relations of his work.

Just so Hooke. His many inventions, his speculations, his projects for lines of research typify a form of activity far more characteristic

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U.Q.

of the scientist than the unwavering pursuit of a single end. The nineteenth century romantic stereotype of the solitary scientist was a misleading caricature of the reasonable majority who, working between the poles of publishing society and institutionalised laboratory, built up the ever-increasing mass of scientific record.

In Hooke's day permanent laboratories were used by only two classes of worker, neither of whom was in the main stream of scientific advance; the assayers and the pharmacists. Nevertheless, Hooke was given a unique charge, altogether Baconian in conception, namely Curator of Experiments to the Royal Society. He became in this way possibly the only Englishman of his age who was at one and the same time exposed to an atmosphere of speculative philosophy and also compelled to live in daily communion with experimental material. This is the lot of the average modern institutionalised scientist, working nominally with unlimited intellectual freedom, but in fact a 'curator of experiments', directed, as Hooke was to start with, by the policies of committees and by the administrative decisions of the Lord Brounckers of our time.

Mrs. 'Espinasse laments the decline of Hooke's influence and fame in the eighteenth century and attributes it to the ill-will of admirers of Newton. This seems to go too far. Others were neglected, not through any influence of Newtonism, but rather through weaknesses in the transmission of the accumulating tradition. It has often been said that science is its own history, but it is more revealing to say that the scientist continually examines his own tradition for the purpose of action, for the purpose of deciding on tomorrow's experiment. The preparation for most scientific work, the examination of the antecedents of the current problem, is of the nature of a historical analysis, not in any literary sense, but — if there can be such a thing as 'practical history' — in a practical sense. The great men whose work most obviously makes progress in science have been those in whom a sense of history was most highly developed. Of Hooke's contemporaries Newton and Boyle had each a clear vision of the antecedents of the issues to which they addressed themselves. The dominance of Newton's work is due as much to what it summarised as to what it revealed; Boyle's influence in chemistry found its fruit only in Lavoisier, the first chemist to compare with him in his capacity for seeing things whole.

Hooke was not built this way. No line of thought leads up to his work, none leads away from it. He left no immediate successors even

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of the type of the professional scientist, the modern succession of whom begins with Lavoisier: 'scientist, economist, and social reformer' as McKie calls him. A detailed comparison of these two men would be interesting. Both were nominally responsible to higher authority for the direction of their work at first, but they soon established independent positions. Both were in intimate contact with social and economic problems of their times and worked to order on public enterprises needing advanced technical knowledge. Both investigated phenomena of their own selection and have entered the scientific tradition labelled with individual discoveries. But while both may be said to have enlarged 'The Knowledge of Causes and Secrett Motions of Things', only Lavoisier can be said to have enlarged 'the Bounds of Humane Empire to the Effecting of all Things possible'. Would it have made any difference if in their separate times the discovery of the law of springs had been vitally important and the discovery of the nature of combustion unimportant? Would Hooke now be revered and Lavoisier in need of a Mrs. 'Espinasse to apologise for him?

It is all very well to praise Hooke for his prognostications and for his projected schemes of research. No good Royal Society man could help being a Baconian and considering possible paths to knowledge. Hooke could leap further in the dark than most men, but a good guess is not good science unless it is so supported by observation, experiment, or mathematical analysis as to become 'serious, entire and of some magnitude'. By this last test even Hooke's monument, the *Micrographia,* must be judged a triumph of dilettantism.

This all amounts to saying that Hooke ought to be estimated by his biographer in terms of the general history of science. Is this fair? So long as the common reader is, by and large, ignorant of the scientific tradition, and even of the record of events of the history of science, the answer must be that it is not only fair but essential. Science is meaningless unless seen as a whole: scientists are meaningless unless seen as transmitters of a tradition. For example, the formidable complexity of modern chemistry, at first sight utterly resistant to the comprehension of the uninitiated, becomes amenable and accessible as soon as it is approached as merely our way of following on the ancient tradition of atom and element. Boyle belonged in that tradition. Hooke did not, his precocious professionalism preventing him from adding the kind of results that were needed for the advancement of the scientific front as a whole. By the time of Lavoisier the reaction into 'Pure Science' which characterised the early eighteenth century

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had gone so far that it needed a correction. This it received from the activities of a new professionalism, exemplified by the French chemists, which has proved so well suited to an industrial world that it has continued to the present day, its twin organs of research institution and publishing institution penetrating deeply into education, commerce and government.

There may not be much point in speculating how Hooke would have fared had he been born into any other century but it will help us to understand him if we remember what happened when the professionalism which was exceptional in him became general.

Not altogether exceptional in everything, Hooke had his share of seventeenth century amateurism, which cared for experiment and speculation as private things. We cannot deny feeling to the man who could write of a flea: 'the strength and beauty of this small creature, had it no other relation at all to man, would deserve a description.' His architectural work has left a few memorials of beauty. His diaries have left records of loving kindness to soften the picture drawn by his detractors. Nevertheless we must ask whether, given riches and freedom to choose, would Hooke not have dissipated his energy in wild speculations, ranging wider and wider like so many of his dilettante contemporaries? Did Hooke make his mark on the Royal Society or did the Royal Society make its mark upon Hooke, the existence of the group making possible the individual scientist, just like the scientific societies of today?

The relation of the scientist to the community is an anxious problem today when the stereotype of the scientist is a bogey, the reality a stranger to most. Mrs. 'Espinasse's account of Hooke will have done a service if it helps those who stand in fear of the men behind the laboratory walls to believe that it might be possible to say of more of them what she says finally of Hooke: 'One would be glad to be so good a man.'

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seeing their greatest writer of recent times through Mr. Hough's eyes, which is a dismaying prospect indeed.

At the end of a book which aims at comprehensiveness and a completeness of response, and throughout which Lawrence's terms 'blood', 'flesh' and so on have been used against him ('to be alive in the flesh' is Lawrence's 'only supreme value'), Mr. Hough characteristically appears to turn round and face the other way:

> It would perhaps be possible to go back to the beginning, to tread the same path again, tracing the same pattern, but giving a different value to the symbols — and to find that the flesh had never been the flesh in any common acceptance of the term, and that the frail soul had been there all the time. (p. 260)

But surely, if you offer the world your book-length assessment of a great writer, you ought to know what 'treading his path' amounts to or there is no excuse for going into print. If, for Mr. Hough, it is possible that in Lawrence's art 'the flesh has never been the flesh in any common acceptance of the term', why has he discussed and judged that art as if no such possibility existed, so lending his name to a time-honoured misrepresentation? It isn't a matter of 'giving a different value to the symbols' — whatever that may mean; what is needed by anyone treading Lawrence's path is recognition of that life-long preoccupation of his with the inadequacy of the conventional distinction between the 'physical' and the 'spiritual'. That preoccupation, profound and intense, and creating for itself, in Lawrence's art, many forms, Mr. Hough appears not to have noticed; certainly no such awareness is active in his criticism and the consequence is muddle and misunderstanding. (See, for example, the pages 66 et seq., on Ursula-Skrebensky.) And if, for Mr. Hough, *The Rainbow* illustrates or develops the 'religion of the Flesh' that he find adumbrated in a latter to Edward Garnett, his commentary on that novel does little to correct the false and adverse impressions that such a phrase would arouse in, let us say, a Home Service audience.

Mr. Hough, it soon becomes clear, adopts a disastrously limited approach and terminology, and does not get beyond 'plot', 'character', 'form' and so on. Consequently, in so far as his sections on *The Rainbow* and *Women in Love* can lay claim to originality, they are mere nibblings at the surface. And, indeed, in the course of these sections Mr. Hough acquires a sense of something very large and important left untouched by his nibbling, a sense of omission that produces a quantity of references to the 'obscure power' with which Lawrence

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renders 'irrationalities', 'inexplicable fluxes and refluxes of feeling' and 'the obscure side of human relationships'. (What this approach does for 'the obscure side' of the Gerald-Gudrun and Hermione-Birkin relationship can be sampled on pp. 82-7.) But Mr. Hough has his answer: so far from seeing 'much reason to depart from . . . the normal structural canons for the novel', he is able to suggest that Lawrence's plea to Garnett to watch for a new type of novel 'may even be a bit of special pleading for . . . inconsistencies and failures in realisation'. If the cap of Mr. Hough's method doesn't fit, Lawrence's head is at fault! Imprisoned within this limited set of notions about 'the novel' ('Hermione is not very closely integrated with the plot'; 'conceived in normal novelistic terms'), Mr. Hough is denied access to all in Lawrence that is distinctively laurentian, to all that makes him what he is. And of Lawrence's art, it is strictly true to say, he has no conception ('*The Fox* is certainly one of Lawrence's masterpieces of straightforward naturalistic narrative'). This deficiency doesn't embarrass him; he makes of it a stick to beat his author, holding — the evidence is overwhelming — that wherever Lawrence is most himself, there he is least to be admired.

He is least to be admired, for example (to turn to another part, and another aspect, of the book) wherever, in *Pansies,* his subject is the English or their middle classes:

> The poems on the English and those on the middle class — in fact, nearly all that have to do with the class system — are Lawrence at his worst; not because what he says is not true (it is, as far as it goes) but because of the snarling gracelessness of the expression, the reflection of a dreary immature class-consciousness. (p. 209)

Mr. Hough's own class-consciousness, it is relevant to remark, forces itself on the reader's notice throughout the book. He reacts defensively not only to Lawrence's severities on 'the English and . . . the middle class' but also to his most deeply sympathetic renderings of middle class life. In *England, my England,* for example, he finds 'a note of rather strident class-awareness', and when the children, playing up their nurse by threatening to run out to the snake-infested parts of the garden, are foolishly indulged and petted, we are 'probably', in Mr. Hough's view, in the presence of Lawrence's 'resentment at the contrast between this kind of childhood and his own'.

It is true that, in this matter of class-feeling, Mr. Hough balances his critical accounts. Thus after giving us this shock on page 1:

> He has an intense private concern with class-distinctions, but almost

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> none with the functioning class system and the transformations it was going through in his life-time.

he can seem to make amends on page 90:

> Lawrence has a very acute sense of class difference, an infallible nose for the atmosphere of particular groups; and he is not tied to the standards of any one of them . . . the whole picture of the mining district, and the reaction to it of the two sisters who have partly escaped, the story of Gerald Crich's father who had created it all; Gerald's continuation of his work — there is a whole chapter of English social history in these pages.

To make amends in Mr. Hough's way is not merely to contradict oneself, but is simply a desire to get it both ways. Lawrence, who has 'loomed more or less largely in the imagination since the early thirties' (p. vii), 'may be', for all Mr. Hough knows — he is not dogmatic — 'an emotional barbarian' (p. 255).

Whatever it is, then, that Mr. Hough has acquired from Mr. Leavis, it isn't strength of conviction. Here is his testimony:

> I owe most to [Mr. Leavis's] chapters on *The Rainbow* and *Women in Love,* which indeed leave little for a later hand to add. In other places I am conscious of disagreement with his conclusions . . . (p. viii.)

'In other places'! How was it possible for Mr. Hough to suppose that what he had written on those two novels constituted substantial 'agreement' with Mr. Leavis's 'conclusions', that he was in the main endorsing, if slightly modifying, what he had found in *D. H. Lawrence, Novelist*? For while on the one hand his debt to those chapters is large, on the other his *Women in Love* is anything but Mr. Leavis's, and Mr. Leavis's *The Rainbow* is anything but his. The explanation is that having, as Mr. Hough says, 'little' of his own to 'add', he has added it to a re-written Leavis, Leavis re-written with a denaturing journalistic looseness. The process may be scanned in the following comparisons: the relation between the two novels (Hough 54 and 76, Leavis 96-98); Lawrence's relation to his material (H. 54-55, L. 131-132); Ursula's 'changing world' (H. 66, L. 136); Ursula/Lawrence (H. 68, L. 137); the kinship with George Eliot (H. 61 & 72, L. 112, 121 & *passim*.).

While it was natural that Mr. Hough should draw confidence and hints from an earlier and more skilful 'hand', what these comparisons reveal is that indebtedness does not necessarily involve understanding and that disagreement may prove the opposite of independence.

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Marcel Proust and Deliverance from Time. GERMAINE BRÉE. *Chatto and Windus.* 21*s.*

It is probably more difficult to write on Proust than on any other novelist. The reading of the *Temps Perdu* is as subjective, the appreciation as complex as the work itself. We are not allowed to remain outside and judge in a kind of detachment the unfolding of the novel. What is required from us, and enforced on us, is even more than sympathy: it is a form of intimacy so close that, as we read, we discard our previous vision of life to adopt that given by the book, we substitute ourselves and our own experiences for those of the narrator. Criticism implies a certain degree of objectivity, at least an attempt at explaining the unknown by the known, and therefore, in the case of Proust, the critic may feel it a necessary part of his task to break the bond of sympathy and intimacy, to step outside the enchanted circle of the Proustian world in order to assess it critically. What strikes me immediately as being particularly valuable in Professor Brée's work is that she has reduced this necessity of 'stepping outside' to the minimum. Only in her study of *La Prisonnière* can she be said to have broken the bond of sympathy, with the result that it remains too near the superficial aspects of what she is considering and fails to grasp entirely, underneath the almost pathological setting of *La Prisonnière,* the more general and more human implications.

As Angus Wilson has very rightly said in the preface, Professor Brée's work is not an introduction to be read by those who do not yet know Proust. This assumption of knowledge on the reader's part has enabled the critic to do what one wishes more studies on Proust would achieve: to go straight to all the central problems almost to the extent of giving from the start the reassuring impression that the Proustian universe is examined from within. One cannot praise her too highly for having discarded the slow, biographical approach, the dogmatic and so often irrelevant philosophical theorising, and the pernicious distinction between content and form. Each chapter is centred on some essential aspect of the *Temps Perdu* while taking into account the complexity of this aspect. The book is not long, but it includes most interesting studies of such important points as the architecture of *Le Temps Retrouvé,* the poetic vision of the world, the patterns which constitute the artistic achievement of the novel, the drama of solitude and loneliness, and an extremely perceptive analysis of the comic.

Although as a rule Professor Brée avoids the philosophical jargon

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and hollow phrases which seem to be the fashion in contemporary criticism, one may regret seeing now and then, almost side by side with terse and illuminating 'formules', a tendency towards an inflated way of expressing things which could be more simply and clearly put, as well as her reiterating use of the words 'mysterious' or 'mystery' (occurring sometimes four or five times on the same page).

Professor Brée, as I have already said, has been careful to preserve the complexity of all the problems she examines. But, and it was obviously her right, she has emphasised some aspects of a question more than others, and this may inevitably lead to possible disagreements in interpretation. The stress on the inhumanity of Proust might for instance appear to some as a distortion. Nobody would deny that the picture of man and society in Proust is a cruel one but, even after the motives of the narrator and of the other characters have been rigorously stripped, a constant human tenderness emerges; partly through the immense value of the uniqueness of each human life (a conception which, as Professor Brée rightly points out, is an essential part of the Proustian vision) and partly through the comic vision, where tenderness is so mixed with a way of showing us his characters as disarmingly naïve and vulnerable that one might have expected Professor Brée to have mentioned it as one more dimension in the 'human comedy'.

In Chapter II 'From time lost to time regained' we are given an analysis of the opposition between, on the one hand, the ordinary vision of things and human beings as it appears to the narrator before the wonderful discovery and, on the other, the ultimate Proustian vision. This opposition is of course the central point of Proust's work. But in this chapter it seems that, in order to show better the contrast between a world in which everything appears futile, repetitive and insignificant and the joyful illumination of the new redesigned universe, Professor Brée has overstated her case to fit the argument: the narrator's gradual discovery of the laws and patterns which condition human actions is placed on the debit side, as belonging to 'sterile logic of intelligence'. There appears to be some confusion between the mechanical routine of habit leading to '*désenchantement*' and the stimulating awareness of patterns, a positive, exciting experience which is part of the salvation.

There is a further problem on which some readers might wish for a slightly different stress. In bringing out the theme of the artist's vocation this book, like most others, tends to accept as a universally

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valid conclusion that art alone 'can exorcise the enemies of human happiness'. Twice Professor Brée makes an interesting remark on the fact that the creation of a new, unpredictable and yet strictly ordered vision of the world is a quite normal process and that 'everyone in this sense is a seer' (pp. 17 and 63), but this point is not followed up and the book does not make enough effort to see what values the Proustian world offers to the non-artist. Yet isn't it the real test of Proust's achievement that every reader, not himself an artist, not a homosexual, living in a world very different from that of the Fauborg St. Germain, will be compelled to recreate, to redesign his own life? Prompted by the double shock of discovery and recognition, vicariously liberated from ready-made concepts, he will himself realise, in a joyful illumination, the unique value of his own experience and will reconsider with new eyes the well-known and essential problems of suffering and love, heredity and environment, time and places, youth and old age, and moves from his own particular hell to his own paradise regained.

The translation of Professor Brée's work into English is not bad as a whole but there are some regrettable howlers, the worst perhaps being 'Rachel as to the Lord' for *'Rachel quand du Seigneur'*.

ODETTE DE MOURGUES.

From Generation to Generation. S. EISENSTADT. *International Library of Sociology and Social Reconstruction, Kegan Paul,* 42*s*.

This book, the second which Professor Eisenstadt of the Hebrew University has contributed to the International Library series, is about growing up and growing older. It starts from the assumption that the biological processes involved are much the same in all societies, and tries to account for the different ways in which these processes are culturally defined and interpreted. The book is an essay in wide-scale comparative sociology, almost over-systematic except in the details of proof reading, and ranges over numerous primitive, historical and modern societies with an assured sociological scholarship. Its object is the formulation of some universally valid principles which would account for the many differences in structure and functions of age-groupings, from the formalised age-sets of such people as the Nandi of Kenya in which men at every age know their status relative to others in the society, to the adolescent gangs of industrial Europe and America.

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Comparison of such widely different societies naturally involves considerable simplification of the principles of social organization of each particular example chosen; and here, the author has been helped by the schematic representation of 'the social system' provided by the American sociologist Talcott Parsons, who has worked out a logical model in terms of which, it is suggested, society may be understood. Professor Eisenstadt explains in a long footnote the methodological framework of Talcott Parsons which he has taken over for the writing of this book, and the general reader will find much of the present work barely intelligible unless he first masters the vocabulary explained in that note.

It must be admitted that the style and construction of this book will do little to recommend it to the general reader, for whom, it might be claimed, it was not intended. Yet, it deals with problems of considerable public interest. The author treats, for example, of the circumstances in which younger people tend to band themselves together, sometimes in open and radical opposition to the standards endorsed by their seniors, and suggests how it comes about that this rebellion of youth is a feature of some social structures rather than of others. He examines the social conditions in which the experience of older people is most readily respected and assimilated by younger generations, and puts forward convincing theories to account for the difference between the formal age-stratification of many primitive societies, the informal groupings of the young and old in some peasant societies, and the more casual treatment of relative seniority which modern society tends to produce. In our own society, with its wide freedom of choice for adults in such matters as residence and occupation, with its social mobility, and with its educational system which encourages both specialisation and individual competitiveness, seniority and authority are less closely linked with age than with personal and technical competence.

More generally, Professor Eisenstadt elucidates a familiar anthropological thesis that age-groupings are the means by which the family and kindred, among whom a man leads much of his life as a child, are made to yield some of their claims upon him to the wider social world which he enters as an adolescent and an adult. Strongly formalised age-groupings, he suggests, are thus often most emphasised where family and kin do not provide a means of participation in the total political and social life of a community. The book concludes with the suggestion that the unimportance of formal age-grading in modern

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society, at least for those who have passed adolescence, is not an indication of social instability, but is consistent with the differentiation of role and occupation and the freedom of individual choice upon which the form of our society now depends. Professor Eisenstadt has not been able entirely to free himself from the static model of a 'balanced' or 'stable' society which has been the starting point for so much sociological and anthropological analysis. By almost personifying Society, he occasionally falls into the habit of attributing to it needs, and suggesting that it has tasks to perform: 'One of the main tasks facing every society and social system is to provide for the perpetuation of its own structure, norms, values, etc., in spite of the changes continuously wrought in its composition by deaths and births.' Such general statements would benefit from the attention of the most rigorous semantic criticism of modern philosophy, and the book leaves one with a regret that the influence of that criticism has scarcely made itself felt in sociological writings, of which it might be sometimes said as in Hudibras:

> Their notions fitted things so well
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GEOFFREY LIENHARDT.

Heinrich Heine. A biography. E. M. BUTLER. *The Hogarth Press*, 21*s*.
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above all the terrible disease of his last years. From all this Heine wrenched some of his finest work. But however heroic his struggle against adversity was at times, he was no hero in his inability to master the defects inherent in his often uncontrollable temperament. Heine, like many a sturdy fighter, was easily wounded and tended to repay attacks tenfold, for his was a sharper pen than that of any antagonist, and he was quick to see through pretentiousness. Of course, he had much to contend with; outright attacks were probably not half as vicious as the ban on his writings, even of those which he was still to write, enacted by the German Federal Diet in 1835. Heine saw himself always as a soldier in the war for liberty; he fought for quality of mind against mediocrity; but he was torn by contradictory impulses. While he possessed generosity of mind and of action and was capable of kindness and patience, he could also be cruel and malicious; indeed, his faults were many, the more obvious as he advertised them himself. But his utterances and actions alike were conditioned by his poetic temperament. For Heine was a poet first and foremost whose poetic cast of mind did not only make him create works of poetry, but also determined the form and quality of his prose; in many incidents of life, indeed, he acted not merely as a temperamental, but as a creative artist, for even here word and action became an occasion for a poetic representation of reality. Heine created so many legends about himself that at times it is difficult to disentangle the truth. This does not mean that Heine was a *poseur*; he indulged rather in a natural inclination to fiction. In many of his statements poetry and prose are intermingled, but he meant them to be received in the light of this knowledge, just as much of his poetry is, in fact, poetry about poetry, a song within a song, as Professor Barker Fairley has convincingly argued.

The biographer of Heine is thus faced with peculiar difficulties. Legends have grown up about his life, and not only about those parts of life where documentation is sparse. Spurious traditions were fostered by over-zealous biographers and academic journalists; champions and enemies of Heine alike, even reputable editors of his works, have not always been careful to distinguish fact from fiction, especially as the fiction often amounted to a really good story, more often than not originating from Heine himself. The apparently highly confessional nature of his poetry also made many biographers turn too uncritically to his poetry for biographical evidence, always a dangerous procedure. In Germany unbiased discussion in any case was difficult; for few

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forgave him for being a baptised Jew who had railed at some of the more obvious failings of the German nation, and it was not seen that such attacks sprang really from love, and not from spite. Furthermore, he had attacked German Romanticism, to which he half belonged, when German Romanticism had become almost a national institution. In addition, his use of language was unorthodox, but it was not always appreciated that he wanted to escape the dead hand of convention. Although in this country, on the other hand, these prejudices were not at work and his work has, on the whole, been praised, critics and biographers, nonetheless, have built up what, in one of the finest contributions to the Heine centenary, Professor Sol Liptzin has called 'the English legend of Heinrich Heine'.

It is the measure of any book on Heine how sanely it guides us through the maze of legend and controversy which obscures the real Heine without impairing our appreciation of his life and work. Professor Butler does so with great skill, successfully marshalling the wealth of incident. She brings his story to life. She wisely refrains from moral judgements, whether of approval or disapproval, on his conduct, but relates his thought and action to their background. (Perhaps here it might have been useful to mention that not only Heine's maternal ancestors, but also, as recent research has shown, his paternal ones belonged to the Jewish financial aristocracy.) Her book not only leaves an impression of fairness, but also conveys the brilliance of Heine's intellectual life as well as his vitality. She makes full use of countless good stories about Heine, whether they are in the form of anecdotes or even of poems. She makes us feel, even if frequently she does not say so, that there are mere stories which, however, contain an element of poetic truth. Nonetheless, it should have perhaps been made more explicit on occasion that some interpretations are only plausible hypotheses where the evidence is, perhaps, of such a nature that a more sceptical jury would return the verdict 'not proven'. This, for instance, is the case in the vexed questions of Heine's illegitimate birth, of whether his parents married only after his birth, having deliberately flouted the refusal of the Rabbis of Düsseldorf to marry them; of whether his love for his cousins Amalie and Therese inspired *Das Buch der Lieder*; of the venereal origins of his disease; and of his supposed love-affair with George Sand. For instance, however plausible the argument of the late Professor Friedrich Hirth and of Professor Walter Wadepuhl on the dates of Heine's birth and of his parents' marriage may appear, it is based on circumstantial evidence;

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or again, Professor Hirth's contention that Heine was one of George Sand's lovers rests on rather flimsy evidence and relies in part on a hardly legitimate biographical interpretation of a poem. But these are questions of interpretation arising perhaps inevitably from the work of Hirth, one of the most indefatigable, but not most logical of Heine scholars. The new facts about Heine's life which have emerged from his second edition of Heine's letters and from his many essays on Heine have made a new Heine biography imperative, though unfortunately his deficient logic promoted quite a few new myths. Professor Butler, while acknowledging her debt to Hirth, is obviously aware of the shortcomings of his arguments. To discuss them in detail would have meant going beyond the scope of her book, for she modestly disclaims having written the definitive biography, but there can be no doubt that she has written a timely and eminently readable book.

Professor Butler's book is strictly biographical, yet her comments on his prose style or on his poetry are often penetrating. Strands of thought are often indicated which, within the frame-work of a biography, cannot be followed up; the more welcome, therefore, is Professor Rose's book, written in an elegant and concise manner. Professor Butler, in her preface, pays tribute to his enlightened scepticism where tradition is concerned, and this quality of mind makes his book an invaluable contribution to Heine studies. For lack of discrimination has been their major defect. This has partly been a result of the violent feelings which Heine's merciless, but always penetrating wit and irony have aroused, partly because Heine scholars often had an axe to grind, especially in his relations with Marx. Apart from some chapters in Professor Herman Uyttersprot's book in Dutch, hardly a widely read language, no systematic account of Heine's political thought had been undertaken *sine ira et studio*. Professor Rose's study answers this need. He unravels Heine's political thought on chronological lines, and shows how the background of Heine's life and of his youth in French-occupied Rhineland, his youthful admiration for Napoleon, his visit to England, his championship of liberal ideas, his antagonism to German Romanticism, his exile in Paris, his critical interest in socialism and communism as well as the revolutions of 1830 and 1848 affected his thinking. He also shows how his love for Germany came into conflict with his enthusiasm for freedom and often turned his love into hatred, *Hassliebe* as the German term runs. He also indicates the catholicity of his interests, permitting him to be on friendly terms at the same time with Karl Marx and Baron James de

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Rothschild. Although Professor Rose is fully sympathetic to Heine's political thinking, he is not blind to its defects. For Heine's liberal and democratic views cannot be defined with any precision.

> That he was a great champion of individual liberty there can be no doubt. But in what manner this liberty was to be circumscribed in the interest of the community, or by what institutions it was to be guaranteed, he seems to have had scarcely an inkling.

But Heine was a powerful intellectual force because he was a political satirist of major calibre. 'The vivid brilliance of his style both in ridicule and in earnest' enabled him to make an impact upon his age. Heine was, however, more than a brilliant, if eccentric, political satirist, he also was something of a prophet. He foresaw much of the future political development.

The changes in the political climate also affected Heine's Jewish feeling, as Professor Rose shows in his second study, for Heine grew up at a time when, under the influence of Napoleonic rule, German Jews were granted the same rights as their Christian compatriots, although after Napoleon's defeat the *status quo* was quickly restored as far as possible. He shows how Heine grew more and more estranged from the orthodox faith of his ancestors until he took the step of final severance from the Jewish religion, that of baptism into the Lutheran church, although this did not express a conversion to the Christian faith. Professor Rose describes how strong the Jewish element was in Heine's writing, for if his intellectual attitude to Judaism was consistently critical and mainly negative, his feeling about the Jewish people was emotionally complex and contradictory. Professor Rose also analyses Heine's 'conversion' during his last long drawn-out illness. Perhaps it is a testimony to his antagonism to pretentiousness and sham solemnity, rather than a proof of lack of seriousness, that even in his most agonising spiritual torments his wit was not banished. This religious 'conversion', however, was not a return to Judaism, but 'the change in him might have taken a different turn if he had not been a Jew', for his emotional attachment to the Jewish people conditioned his belief. Professor Rose's lucid analysis of the intricate changes of heart should clear away many obstacles to a better understanding of Heine. It is to be hoped that his book, like that of Professor Butler, will stimulate further interest in Heine, for his detached scholarship has provided us with a convincing portrait of some facets of Heine's baffling mind.

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